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Petroleum Exposition Number---No. 1

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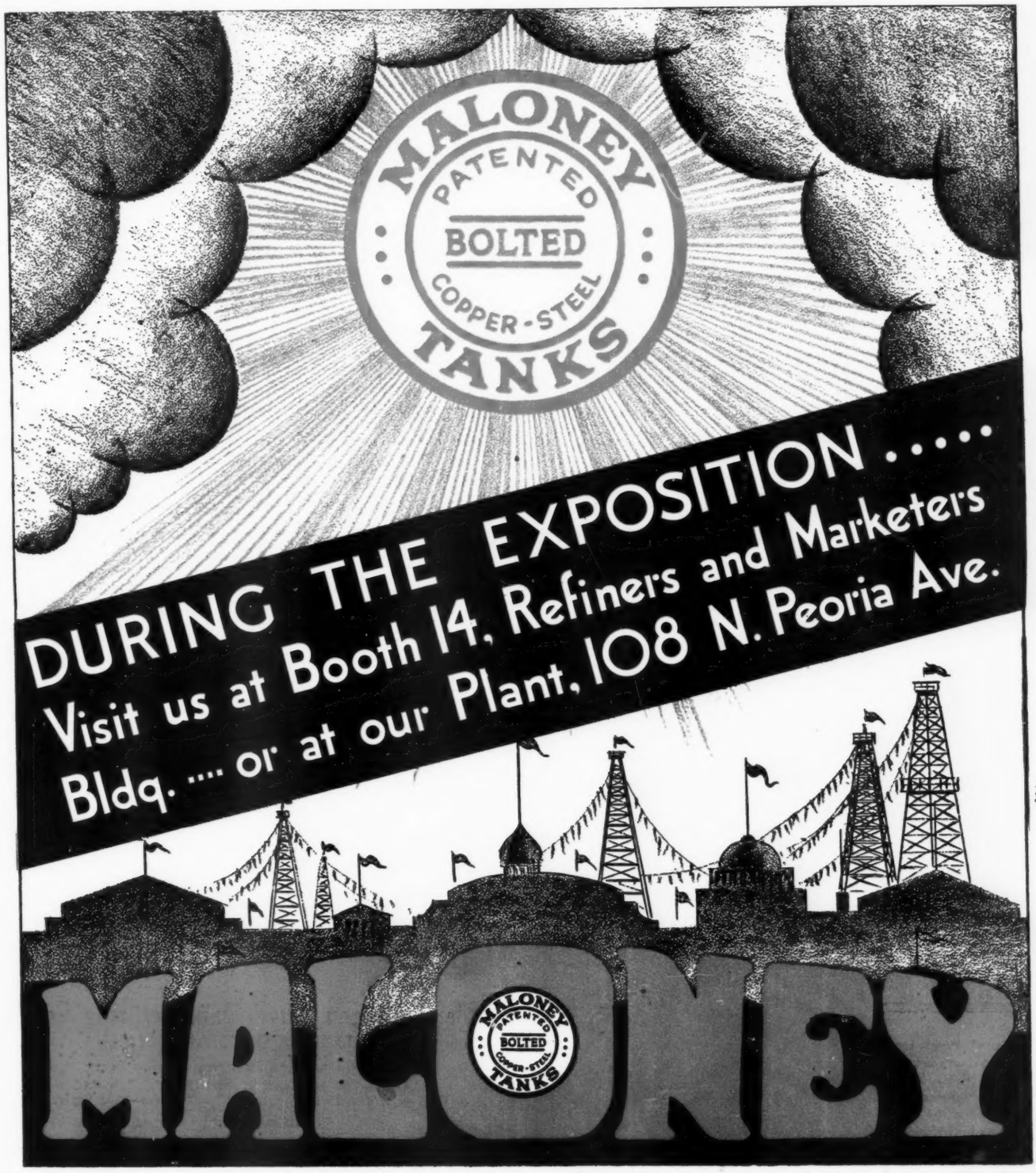
The OIL and GAS JOURNAL

PRODUCING REFINING ENGINEERING MARKETING

Published Every Thursday TULSA, OKLAHOMA, OCTOBER 2, 1930 $6.00 a Year



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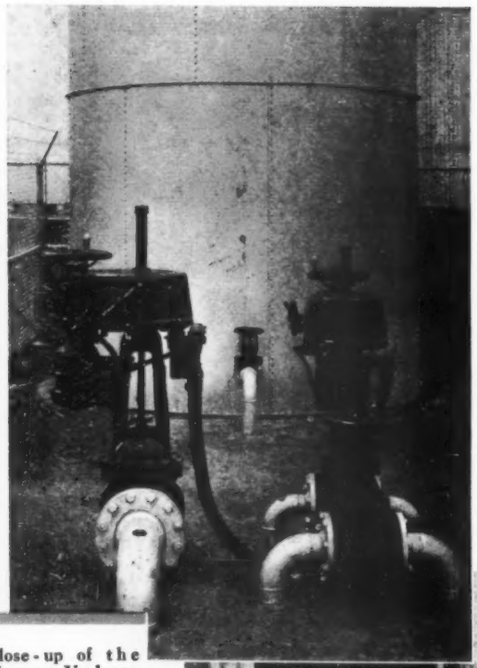
The Automatic Pump Station at the Tulsa Exposition, erected by the Scientific and Technical Committee. Chapman Motor-operated Valves in the foreground.

The automatic pump station at the Tulsa Exposition uses CHAPMAN VALVES *equipped with* CHAPMAN MOTOR UNITS



Close-up of the Chapman Valves with Chapman Motor Units, at the Tulsa Exposition. These valves are operated solely by oil level and oil pressure.

Control Panel for valves shown above. Signal lights indicate at a glance the position of the gate in each valve.

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PRODUCING REFINING ENGINEERING MARKETING

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Crude Production Down to 1928 Level

Highest daily average estimated total production in 1929, week ended Aug. 24, 2,975,435 bbls. Lowest in 1929, Dec. 27, 2,595,320 bbls.

Output Last Week Lowest Since July of That Year. Holding Gasoline Stocks to Present Level Big Need Now

Highest daily average estimated light oil production in 1929, week ended Sept. 14, 2,534,524 bbls. Lowest in 1929, Apr. 13, 2,142,036 bbls.

By Andrew M. Rowley

Production of crude oil in the United States last week reached the lowest average recorded since early in July, 1928. It is still averaging more than 500,000 barrels daily less than during the same period last year. While difficulties are being encountered in making conservation agreements 100 per cent effective in some areas, these problems are rather insignificant when compared to the tasks which confronted leaders of the conservation movement when this movement was inaugurated early in 1927. When it is considered what vast progress has been made in efforts to hold crude oil production more nearly to market requirements in the short space of three years, present problems do not seem so ominous.

Announcements by small refiners of crude oil price schedules under the prices posted by the major purchasing companies constitute a threat in several sections. If this practice spreads, the major buyers will be forced to reduce their posted prices as a matter of protection to their customers.

With crude oil production so much less than last year, crude oil stocks lower than a year ago and consumption greater, there does not seem to be any logical reason for reducing crude oil prices. More than ever, crude oil prices are largely dependent on gasoline prices. This, however, means gasoline prices at refinery and not tank wagon or filling station prices. It is understood the spread between refinery and tank wagon prices will be far less in the future than in the past and that recent reductions in the tank wagon schedule were made with this purpose in view. Hence, such reductions should have no effect whatever on the crude oil price schedule.

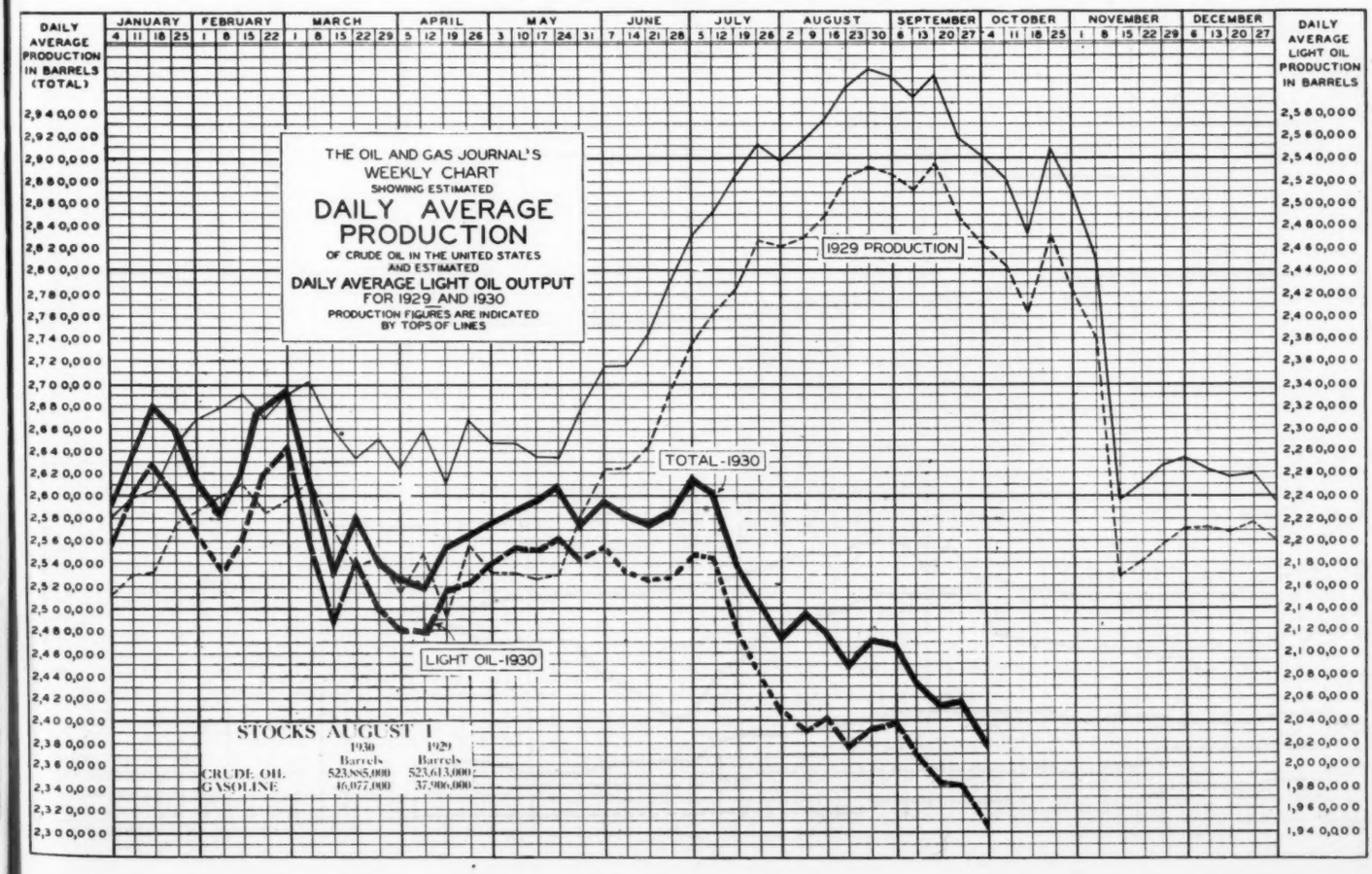
The great need of the industry now is to prevent a further accumulation of gasoline in storage. Holding gasoline stocks at about their present level would be the greatest stabilizing influence on the entire situation. This object can be accomplished if refiners so arrange their operations as to manufacture only sufficient gasoline for current requirements.

PRODUCTION IN THE UNITED STATES

Estimated daily average production of light and heavy gravity oil in the United States for week ended September 27, and a comparison with the previous week follows:

	Sept. 27		Sept. 20	
	Light	Heavy	Light	Heavy
Oklahoma—				
Oklahoma City	104,385	.....	98 860	.....
St. Louis-Pearson	25,370	.....	24,910	.....
Seminole	142.745	.....	150.215	.....
Northern miscellaneous	226 635	.....	228,840	.....
Southern fields	59,390	.....	59,985	.....
Total Oklahoma	558,525	.....	562,810	.....
West Texas—				
Hendricks	61,403	.....	67.200	.....
Yates	105,440	.....	105,090	.....
Remainder	100,163	.....	99,827	.....
Total West Texas	267.006	.....	272,117	.....
North Louisiana	34,800	5,270	35,230	5,270
Arkansas	16 815	36,790	16 835	36,810
North Central Texas	101,711	.....	103 250	.....
Texas Panhandle	77,855	.....	81,751	.....
East Central Texas	42,107	.....	41.600	.....
Kansas	116,420	.....	116,970	.....
Total Mid-Continent area	1,215,239	42 060	1,230,563	42,080
Gulf Coast	.....	192,233	.....	194,242
Southwest Texas	.....	112,524	.....	107,941
Eastern	118,000	.....	120,000	.....
Rocky Mountain area	112,411	.....	113,418	.....
California—				
Santa Fe Springs	96.500	.....	104,500	.....
Long Beach	100,000	.....	102,500	.....
Playa Del Rey	19,500	.....	18.500	.....
Elwood	30,000	.....	42,000	.....
Ventura Avenue	47,500	.....	47,000	.....
Kettleman Hills	24,250	.....	23,500	.....
Remainder of State	183,000	89,000	184,500	89,000
Total California	500,750	89,000	522,500	89,000
Total United States	1,946,400	435,817	1,986,481	433,263
Grand total	2,382,217		2,419,744	

Total Decrease 37,527 Bbls.; Light Oil Decrease 40,081 Bbls.



Few Changes in Oklahoma Quotations

Gasoline and Kerosene Refinery Prices Hold Despite 2-Cent Reduction in Tank Wagon Schedules of Middle West. Await Additional Developments

By C. O. Willson

Refinery gasoline and kerosene prices in Oklahoma (Group 3) and other Mid-continent areas showed little change on Monday and Tuesday following the announcement of a 2-cent cut in tank wagon and service schedules throughout the Middle West effective Monday. The reduction as announced by the Standard Oil Co. of Indiana for 10 states and Standard Oil Co. of Nebraska in Nebraska provided a 2-cent reduction in gasoline tank wagon and service station prices at all points where normal schedules were in effect. The 2-cent reduction in kerosene tank wagon prices was made effective on the same basis. Gasoline and kerosene prices had previously been reduced below normal at several points in the Middle West and no changes were made Monday at these towns and cities.

The refinery market in Oklahoma was unsettled before the Standard of Indiana announcement was made on Saturday and this condition continued on Monday and Tuesday. Although the gasoline market is weak, the Indiana company's reductions, which have been expected for some time, did not result in a flood of offers from refiners as predicted by many of the buyers. Most of the sellers up to Tuesday night had not announced any reductions in their refinery spot sales on gasoline awaiting additional developments before taking any definite action.

All grades of gasoline were available under the quotations of the large sellers, but this was true before the tank wagon and service station reductions were announced. Scattered spot sales of the U. S. Motor grade have been made under 6 cents for the past 10 days. The weakness reflected by these prices appeared to center in the North Texas area, where a few independent refiners are buying their crude oil supplies under the prices posted by the major purchasing companies. These refiners are in a position to undersell other operators and are pursuing a policy of selling from day to day at prices which in some cases are three-fourths cent under the asking price of competitive refiners in Oklahoma and other Mid-Continent groups.

Reductions Discounted

Most of the trade feel that the 2-cent reductions in tank wagon and retail prices have been discounted for several weeks in the Mid-Continent refinery. This applies to kerosene as well as gasoline. Barring a drastic cut in crude oil prices, the sellers feel that the U. S. Motor gasoline price can be maintained around 6 cents with no additional reductions in kerosene. A feeling of uncertainty is expected to continue, however, until a better feeling exists in regard to the crude oil situation. Many of the trade are expecting some adjustment downward in crude oil prices while others are equally confident that no changes will be made in the immediate future.

In regard to crude oil prices one large refinery points out that a reduction of 25 to 35 cents a barrel would not lower refinery operating costs to the point where the average refinery operator could afford to reduce his prices on refinery products. Although this situation will vary with individual refiners, most refiners will agree that plant operations in the Mid-Continent have been carried on for the past several months at a loss and it is assumed that if crude oil costs are lowered, a majority of the operators will attempt to partially offset these losses with profitable operation throughout the balance of the year.

Contract Situation

The 2-cent reduction in gasoline tank wagon and service station prices did not in general affect the gasoline contracts between Oklahoma refiners and middle western jobbers. The bulk of the gasoline refined in Oklahoma outside of that marketed through company-owned stations is sold on contracts.

Most of these contracts permit the jobber to buy on a basis of published quotations with a minimum guarantee of 4 cents between the delivered tank car price and the normal tank wagon price. A 5-cent margin is permitted where the service station price is used as a basis.

Due to the wide spreads that have been maintained all year between the tank car and tank wagon prices on gasoline, the buyers even with the 2-cent reduction still have a wider margin than

(Continued on Page 363)

REFINED MARKET BAROMETER

Reductions in gasoline and kerosene tank wagon prices over large areas coupled with continued weakness in the export situation continued to disturb the refinery tank car market during the past week. Tank car prices on these two products were holding in some areas but in other sections quotations on all grades were reduced. Fuel oil prices at coastal points also reflected weakness, additional adjustments downward being made at several points along the West Coast, Gulf Coast and East Coast. Gas oil despite this weakness in heavy fuel was firm. Furnace oil material is in demand at firm prices. Natural gasoline unchanged. Buying of lubricants both in domestic and export channels was not heavy and some price cutting was reported. Buying of wax has slowed up in the eastern markets but otherwise was unchanged.

Mid-Continent—Gasoline prices holding better than expected, following reductions in tank wagon and service station prices in middle western states. No important changes in kerosene prices. Lubricants weak. Natural gasoline unchanged. Wax more active. Fuel oil, gas oil and distillate prices steady with good demand for low cold test material.

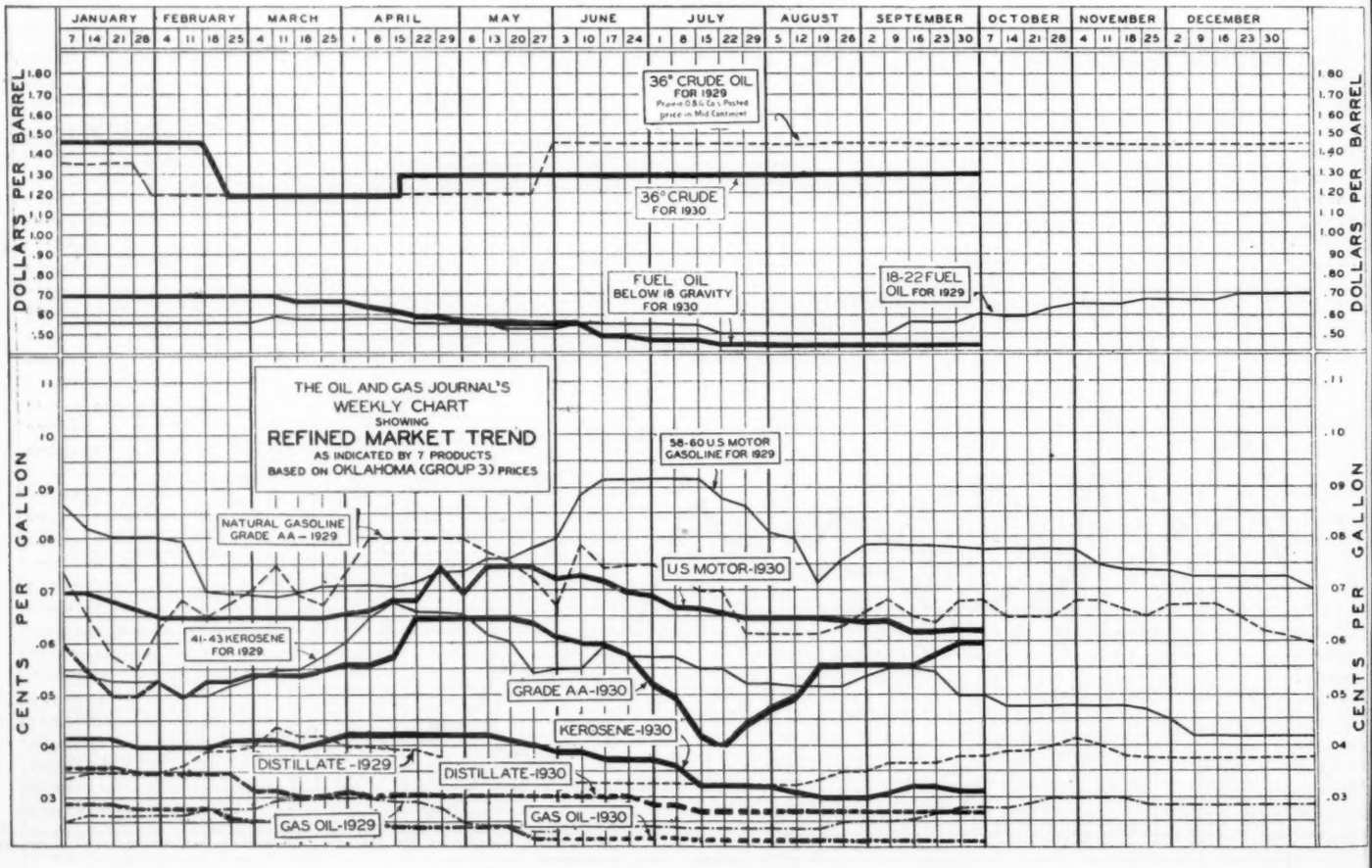
East Coast—Gasoline market more stable following reductions of last week. Moderate demand for kerosene. Lubricants slow. Wax sluggish. Downward adjustments in fuel oil prices at several points following 10-cent cut last week in bunker grades. Gas oil more active.

Chicago—Refinery gasoline market weakens following reductions in gasoline tank wagon prices. Furnace oils and high gravity fuels in demand. Kerosene slow. Other products unchanged.

Gulf Coast—Fuel oil prices lower. Other products unchanged.

California—Better tone to gasoline market although prices for coastal movement have been reduced to meet competitive conditions.

Pennsylvania—Slow demand for practically all refinery products. Prices generally unchanged.



New Kettleman Unit Development Plan

Increasing Probability That Some Form of Unification Will Be Adopted Before the Close of Next January

By L. P. Stockman

LOS ANGELES, Calif., Sept. 29.—Exceptionally good progress has been made in effecting the reduction in crude oil production necessary to bring California's output down to 550,000 bbls. per day and, while it will be some time yet before the new objective is reached, the additional curtailment already made indicates the ultimate success of this revised program which became necessary because of the existing business depression. A substantial reduction in production has already been effected at Elwood and Santa Fe Springs and other fields are being gradually brought into line. Kettleman Hills, however, is far from satisfactory and at the present time it does not look as though crude oil production in the North Dome will be reduced to the allowable of 15,000 bbls. per day established by the Operators General Committee except by compulsory regulation resulting from enforcement of the police powers of the State or general application of unified development. The situation at Kettleman Hills is extremely critical and the production of this field is expected to become a much more important factor in the near future due to the projected completion of new wells on fee acreage located outside the area covered by the Kettleman Hills agreement, unless some method is found to arbitrarily force curtailment.

The most important development from a conservation standpoint aside from the existing curtailment program is the probability that some form of unit development will be adopted and put into effect at Kettleman Hills early in 1931. There are still some differences to be ironed out but the enormous potentiality of Kettleman Hills has brought home the absolute necessity of regulating production of that field either by unit operation or some modified co-ordinated form of development. Previous to the completion of several substantial producers on fee-owned acreage located outside the area covered by the Kettleman Hills agreement some operators were not especially impressed with the proposal to initiate unit development in the North Dome.

Regulation Must Be Adopted

Upon the completion of these wells, however, it became evident that some method of regulation must be adopted because the necessary competitive drilling which would be required to offset wells on fee acreage would cause field production to exceed the economic limitation within which production must be kept in order to maintain a stabilized price structure. In contrast with previous opinions regarding the advisability of indorsing unit development, Kettleman Hills operators are almost unanimously in favor of regulated production. The plan expected to be adopted by Kettleman Hills operators is comparable with the original plan of unit development only in its basic features, but the new plan now under consideration will accomplish the same result.

The original plan of unit development contemplated unified development of the entire field by one central governing body composed of representatives from each of the operators involved. The cost of drilling and amount of production to be developed under that plan was to be prorated among each of the operators who would in turn be reimbursed for the value of any oil and gas produced. The serious defect and principal reason for the scrapping of this plan was the fact that operators practically relinquished control over their respective leases although an equitable participation was guaranteed as far as possible. This objection forced the Kettleman Hills committee to proceed along more conservative lines and remove all possible differences of opinion as far as possible.

New Plan Under Consideration

The new plan now under consideration appears much more satisfactory as it affords operators maximum protection both from a production and development standpoint. Operators are consequently far more nearly in accord at the present time than heretofore, and, while several minor changes may be made, operators feel confident that the enormously productive acreage of Kettleman Hills will be brought under a unified development plan between now and January 31, 1931. The Colton Bill passed at the last session of Congress authorizes holders of government leases at Kettleman Hills to pool their acreage for unit development and at the same time allows the Government through the Department of Interior to become a participating member. It is specifically provided in this bill, however, that this unit development plan must become effective before January 31, 1931. It is obvious, therefore, that some definite form of unification will be ratified before the expiration of this period.

The new plan of unit development now under consideration tentatively provides for single development, although this angle of the situation has not been definitely settled. The Standard Oil Co., which has maintained a very commendable attitude in regard to unified development at Kettleman Hills, is opposed to single unit development. This company is in favor of a double unit of development whereby its holdings will be developed on a unified basis and the productive acreage of all other companies developed on another comparable basis. This double unified system will be coordinated and governed by one central governing body. The position of the Standard in this connection is well taken as the company does not wish to be placed in the position of appearing to dominate future development. The Standard owns and controls approximately 52 per cent of present potentially productive acreage. This would give the company the greatest voting power if this method of operation is adopted and it has been thought for the best interest of all concerned to remove every possible objection.

Double Unit Development

Operators controlling government leases as well as those holding leases on fee-owned acreage are somewhat opposed to the double unit method of development. They contend the entire field should be developed as one single unit irrespective of ownership. This is one of the angles which has retarded adoption of unit development at Kettleman Hills. It should be specifically understood that this difference of opinion merely concerns the operating status and not the advisability of unified development. It might not be amiss to mention that President Kingsbury of the Standard and President St. Clair of the Union were the first to suggest unit development at Kettleman Hills, both having realized the enormous productivity of this field and decidedly unfavorable effect which it would exert on general conditions if developed without restraint.

The unit plan under consideration at the present time contemplates the inclusion of all productive acreage in the field. This will also be the case in the event that the double unit plan is adopted. It is the present plan to outline the total probable productive limits of the field so that all potentially productive acreage may be included. If subsequent developments extend beyond this theoretical line this acreage will subsequently be permitted to be included in the total amount of participating acreage. If any of the originally included acreage is disproved this will be excluded from participation.

The present plan covers all petroleum products which may be produced at Kettleman Hills, specifically mentioning all crude oil, natural gasoline and natural

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Secretary Wilbur Visits Kettleman

Unit Plan Committee Making Good Progress. Dr. George Otis Smith to Complete Arrangement. Difficulties Admitted

By Charles E. Kern
Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Sept. 27.—"The committee to promote unit production of oil property in the Kettleman Field of California is working industriously and we hope it will soon be far enough along to have Dr. George Otis Smith, director of the Geological Survey, go to California to complete the arrangement," stated Dr. Ray Lyman Wilbur, Secretary of the Interior, today. The secretary has just completed a trip through the West in which he looked into the situation at Kettleman Hills.

Principle Approved

"The fact that the committeee was chiefly discussing a fair way to bring about unit production rather than the wisdom of unit production is a good indication of the feeling that prevails among the members of the committee. With the amendment of the law that has been obtained we are now in a better position than ever before to make a plan for unit production effective by having royalty owners and holders of A and B leases join in the plan. The great difficulty in coming to a prompt agreement in that field is that it is too good.

"It seems that this field will prove a great source of natural gas," Doctor Wilbur added, "insuring a large volume for use outside the field in addition to having an abundance for producing wells. The unit production committee has until January to work out a plan, and I am expecting entire success for the plan through this means.

"If the Government joins in making this unit plan successful on public land, the result cannot fail to be far-reaching in its good effect in other localities because to bring government land into such an arrangement is a new conception," Doctor Wilbur stated.

R. L. Wilbur

Oklahoma Litigation

"I think it can be done, but it will be very difficult," the secretary declared. "Public sentiment, however, is behind this movement to prevent waste of natural gas of the field, and it has been increasing."

Doctor Wilbur summarized the situation as follows:

"The oil conservation movement still affords one of our most troublesome problems. The question of whether the California state gas law will become effective will come up in a few days in the state Superior Court. This law provides for conservation measures in oil fields. In Oklahoma a suit has been filed to test a similar law in that State with a view to breaking up the whole conservation scheme, which hinges around conditions in California, Oklahoma and Texas and the laws in those three States.

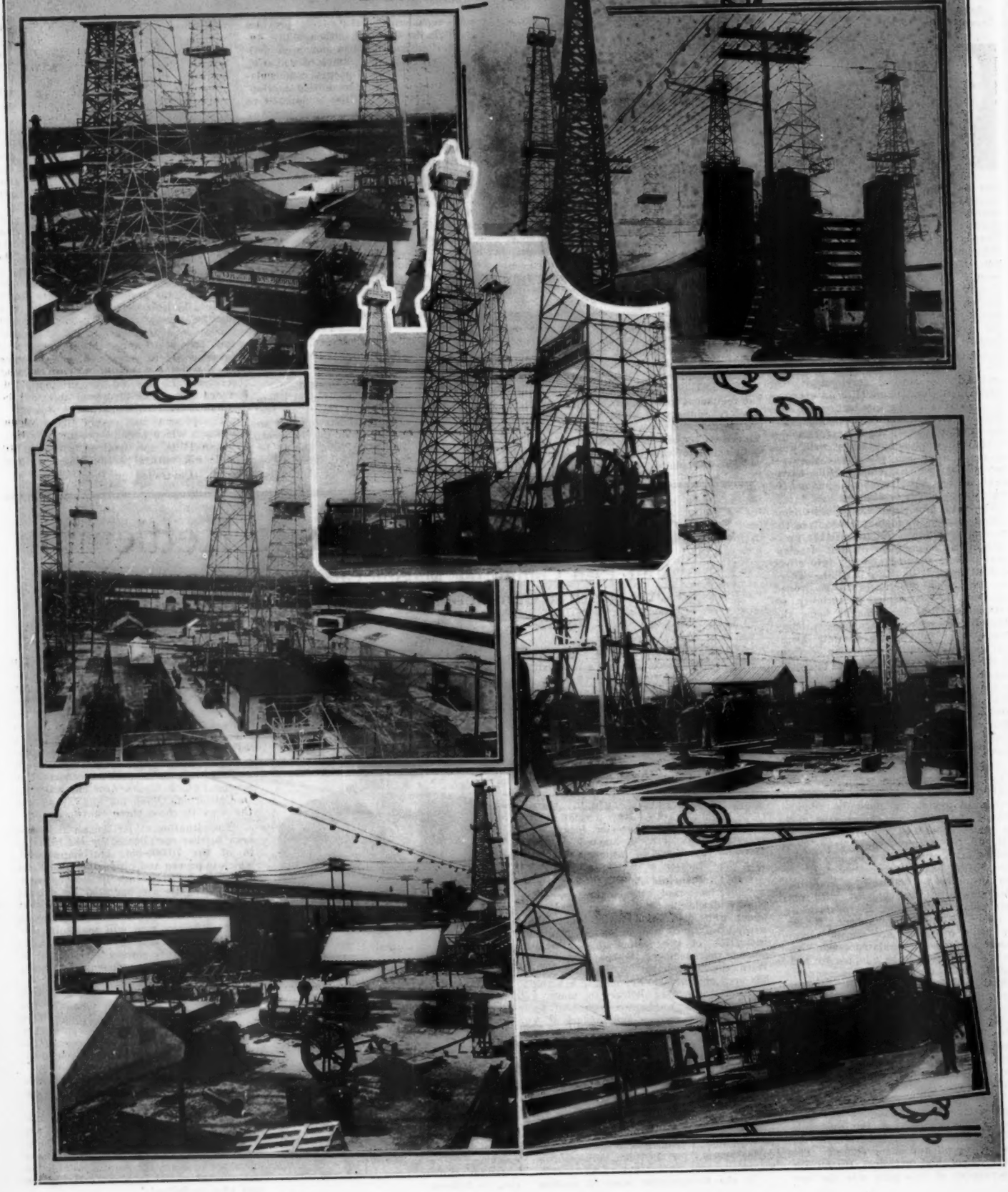
"The situation at Kettleman Hills has been further complicated by the bringing in of the 10,000-bbl. Huffmann well, which is proven and producing. The Felix and Whepley wells are likewise producing. The wells are operated by private or individual companies. It may be that an agreement will be reached among other producers who will maintain production to offset that of these three wells if their operators cannot be included in it. Terms of an agreement are being worked out now.

"It has been said that if Kettleman Hills would produce at its capacity, the rest of the California wells would have to go out of business. The reason is that a barrel of crude from Kettleman Hills will make double the gasoline of ordinary oil.

"At present there is an enormous waste of natural gas in the field, which the department is anxious to check.

"The Government is in a 'minor position' because public lands in the field are a relatively small part of it. If permittees on this land are restricted and other operators produce, the permittees and the Government would both lose. Hence the unit plan is desired."

Pre-Opening Views
INTERNATIONAL PETROLEUM EXPOSITION



Putting Finishing Touches on Oil Show

Greatest Exhibition of Petroleum Industry Equipment Will Open in Tulsa Saturday. Facilities Enlarged and Improved

Although there is 30 per cent more space than in any previous oil show, the bustling army which is arranging the exhibits for the seventh International Petroleum Exposition and Congress which opens in Tulsa next Saturday is racing with time in placing everything in shape with all the confidence of a predetermined winner.

Rockets bursting high above the heads of the gathered visitors will send down a shower of parachutes bearing the flags of nations represented in the "World's Fair of the Oil Industry" to herald the opening of the petroleum event, at the signal of Robert P. Lamont, Secretary of Commerce.

A notable list of speakers has been arranged for the formal opening ceremony by Ralph Talbot, who is in charge of this special feature.

Greetings of the State of Oklahoma to the visitors will be presented by Gov. William J. Holloway, and Mayor George L. Watkins will give the address of welcome for the city of Tulsa.

Talks appropriate to the occasion and of interest to the oil and gas men in attendance will be made by Edwin B. Reeser, president of the American Petroleum Institute, and Henry L. Doherty, head of Henry L. Doherty & Co. Congressman Charles O'Conner of Oklahoma will present the address immediately preceding that of the Secretary of War.

One of the most striking facts about the oil show is the vast range of its appeal. The exposition policy, once firmly wedded to the production end of the industry, has undergone an expansion which now meets the requirements and interests of the roughneck and roustabout, the tool dresser, the contractor, the pipe liner, the tank farm employes, the refinery and natural gasoline plant men, the marketers, the filling station operators, chemists, physicists, welders, and all others associated or connected directly or indirectly with the petroleum industry.

Grounds in Splendid Shape

To make a complete survey of the exposition the visitor must walk more than 5 miles over concrete sidewalks and floors without retracing his steps. Thousands of tons of heavy concrete, chat and sand have been spread over the entire grounds, and continued firmness to this floor is assured by the addition this year of 24 large drain basins and the underground network of 75,000 feet of sewerage lines.

The oil show exhibits range from the tiny and extremely delicate electromagnetic instruments to small refinery and natural gasoline plants in operation, pounding drilling units, gas compressor stations, welding equipment, pipe treating and wrapping machines.

The automatic pipe line pumping station completed at the grounds by the American Society of Mechanical Engineers has aroused the interest of the industry in all parts of the world. This station is located just east of the Marketers and Refiners Building and must not be considered as a model. It is an operating station such as one would see in the field, with pumps, valves, tanks, piping, etc. In this station the engineers have developed an unusually complicated arrangement because the station is intended for research work and presents the features of three distinct types of automatic pumping stations. The remote control feature will be demonstrated when the pumps are set in motion and the fluid movement directed from an instrument board located in a downtown hotel.

The United States Bureau of Mines, Bartlesville station, will present an oil field control laboratory which will eliminate long delays when analyses are called for in connection with cementing jobs, mud fluid, gas conditions, emulsions and water conditions. The bureau will also display some of the more important among the 200,000 products from natural gas. This latter exhibit will astound many who suppose that the most important function of natural gas is to cook food. What could be more removed from this use of natural gas than the extraction of propane from it as the freezing agent in many modern refrigerators?

The American Express Co., official transportation agents for the oil show in Europe, in co-operation with the White Star Line, has completed an active publicity campaign which has interested thousands of European oil men. An itinerary prepared by the express company began September 25 with the sailing of the S. S. Olympic from Southampton, England. Delegates on this tour will arrive in Tulsa on the opening day of the exposition and will remain until the oil show closes. A tour will then be made over the principal oil fields in the Mid-Continent area.

The associations connected with the industry, such as the American Petroleum Institute, the American Society of Mechanical Engineers, the American Institute of Mining and Metallurgical Engineers, the American Welding Society, the American Association of Petroleum Geologists, the American Association of State Geologists, the Mid-Continent Oil and Gas Association, the Independent Petroleum Association of America, the Natural Gasoline Manufacturers Association of America, the petroleum division of the National Credit Men's Association, the Purchasing Agents Association, the Scouts and Landmen's Association, the National Conservation Service, and numerous others will participate actively in the oil show program.

The exposition's open forum will be conducted in the auditorium building October 10 and 11. Discussion of any subject relating to the petroleum industry is invited. The open forum committee is headed by George G. Oberfell.

Safety Demonstrations

Don J. Wallace, safety director of the Mid-Continent Oil and Gas Association, will have charge of the safety and first aid demonstrations on the exposition grounds. One set of safety exhibits will show the different stages in the evolution of the present standards of safe practices and equipment. This development covers the relatively brief period between the first oil show and the current exposition. When it is shown how the industry has succeeded in putting into effect methods and practices, and installed guarded machinery which has resulted in the saving of life and the protection of employes from serious injury, the story of the industry's greatest achievement will be told.

Among the most enjoyable of the oil show features are those in the hands of the "Old Timers" committee.

On Old Timers Day, October 8, the

(Continued on Page 361)

William B. Way, general manager of the International Petroleum Exposition and Congress, in a pose only the photographer has seen for many weeks. Bill has been so busy getting everything in good shape for the big show he had forgotten he had a chair in his office.

MANY MEETINGS OF IMPORTANCE SCHEDULED DURING EXPOSITION

While originally announced as the International Petroleum Exposition and Congress, little attention had been given to the Congress part of the program after the first year until now. This year the number of important meetings of great associations interested in petroleum will be a feature of the exposition season.

They will begin before the official opening of the exposition itself, opening Thursday morning, October 2, with a meeting at the Mayo Hotel of the General Committee of the American Petroleum Institute, Division of Production, with Chairman W. N. Davis presiding. In the afternoon of the same day the Division of Refining Committee of the American Petroleum Institute will meet at the same place with Chairman W. M. Irish presiding.

Thursday morning also the Petroleum Division of the American Institute of Mining and Metallurgical Engineers will open its fall meeting at the Mayo with a number of important papers on problems of the oil industry.

The General Committee of the Marketing Division of the American Petroleum Institute will meet at the Mayo Friday morning with Chairman Henry M. Dawes presiding. At 12:30 the directors of the American Petroleum Institute will meet at luncheon at the Mayo Hotel with President E. B. Reeser in the chair.

The meetings of the A.I.M.E. will be continued through Friday.

On Monday, October 8, which the exposition has designated as American Society of Mechanical Engineers Day, the opening session of the Petroleum Division of that society will be held at the Auditorium, on the exposition grounds, with William G. Heltzel as chairman. The papers prepared by members of this division will be read and discussed at the morning and afternoon sessions on Monday and will be continued through Tuesday and Wednesday. The papers on refining subjects will be presented Wednesday.

On Thursday, October 9, the Fifth Annual Mid-Continent Oil and Gas Association Safety meet will be held, concluding with a dinner at 6:30 p.m.

On Friday, October 10, an open forum will be held in the Auditorium under the auspices of the Scientific and Technical Committee of the exposition, W. A. Schlueter chairman, G. G. Oberfell presiding.

FEDERAL COURT UPHOLDS OKLAHOMA COMMISSION

OKLAHOMA CITY, Sept. 30.—The federal court this afternoon upheld the State Corporation Commission on every point in the suit begun by the Champlin Refining Co. attacking the State's plan of oil proration.

H. G. McKeever, counsel for the plaintiff company, asserted that the State is allowing Oklahoma operators to carry on a price-fixing agreement with the approval of the State Corporation Commission. W. L. Murphy, assistant attorney general, upheld the constitutionality of Oklahoma's conservation act. Affidavits presenting the facts in the case were introduced at the opening of the trial.

Mr. McKeever said the Champlin company has its own wells, can carry its oil through its own pipe lines to its own refinery in Enid and market its products through its own filling stations. "If I can do this without wastage, who can tell me I have no right to do it?" he asked.

Arguments were presented today in favor of the commission's regulations by leading attorneys of the oil industry.

D. D. Wertzberger
Alf G. Heggem
Frank J. Hinderliter
W. G. Skelly
A. W. Leonard
O. T. Dawson
William Holden
Members
Executive
Committee
International
Petroleum Exposition
and Congress
1930

Hugoton Area Has Vast Gas Reserve

Estimated Sufficient Natural Gas Available to Last 30 Years With Withdrawal of 500,000,000 Feet Daily

By Dorsey Hager*

The Hugoton gas area now covers all of Stevens County, parts of Seward and Morton Counties, Kansas, and part of Texas County, Oklahoma. It may extend north into Grant County, Kansas. This new gas area is so vast that it has become of great economic importance in the plans that have matured for drawing natural gas from the Southwest to the great industrial centers of the Middle West. Yet 16 months ago it was not considered of any importance by the large gas concerns. E. G. Woodruff, in an article published in The Oil and Gas Journal of September 11, described the developments as of an earlier date. This new article can but supplement his work. The writer has been closely in touch with developments in the field since June 1, 1929. It has been interesting to watch the development from the pioneer state to the present status of a major gas reserve, and to check earlier prognostications all within the brief period of 16 months; for when the writer first saw the field there were but two gas wells, 8 miles apart, and three test wells that had suspended drilling. There was little then to forecast the major development that has since taken place.

*Released by permission of the Argus Production Co. and W. M. McKnab.

William M. (Bill) McKnab, the well known oil producer of Winfield, Kans., deserves the credit for opening the Hugoton gas area of southwest Kansas. It was due to his optimism and vision that this great gas field was discovered, and it is gratifying, also, to know that he has been financially successful—something few pioneers are able to claim.

McKnab, after drilling for gas at Amarillo, conceived the idea that there should be a gas or an oil field in Stevens County, Kansas. He found available a block of leases in the hands of brokers, and made a deal for the drilling of a well on this block near Hugoton. In turn, he interested Walter Sidwell to drill a well for a one-half interest. This test was started in December, 1926, in Section 31-33s-37w, and finished in August 30, 1927, encountering 5,000,000 feet of gas at 2,617 feet and deeper. Gas from this hole, called locally the Crawford gas well, was piped to Hugoton, 8 miles to the northeast.

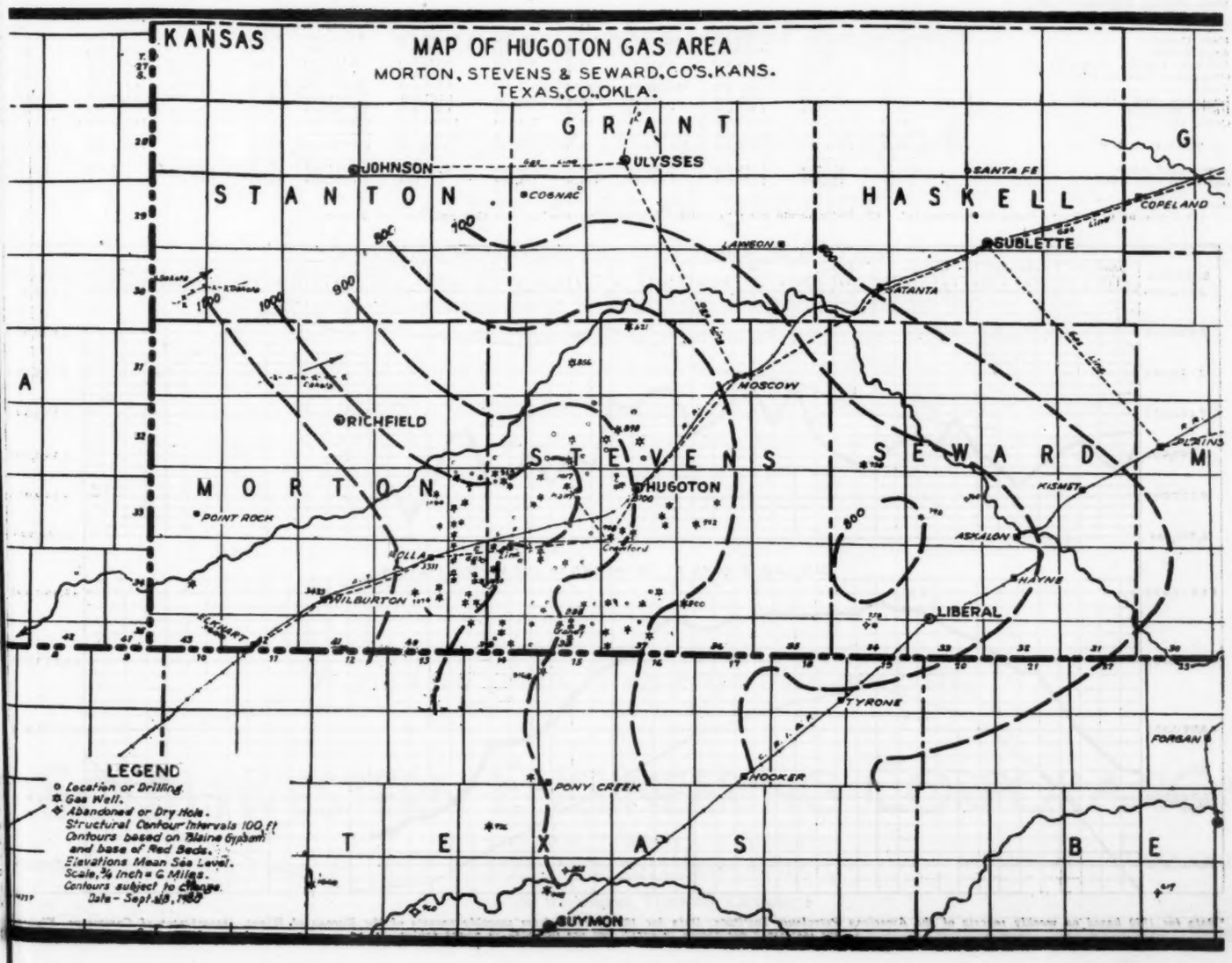
McNab later drilled the Ham well in Section 10-35s-38w, and completed this well early in 1929, with a 6,000,000-foot open flow capacity. The pressure in both wells was 440 pounds per square inch. McKnab, in the meantime, had secured natural gas franchises from Dodge City and adjoining towns, but was having some difficulty in financing his pipe line from Hugoton.

Then A. J. (Gus) Hardendorf, well known in northwest Texas and Wyoming, undertook to finance the building of a pipe line to Dodge City and neighboring towns, and made a deal with McKnab. Hardendorf interested Arthur K. Lee, formerly a banker of Thermopolis, Wyo., and his associates. These men organized the Argus Gas Co., which made a deal to buy natural gas from the Crawford and the Ham wells. The new company, also, acquired acreage of its own. This line was to be completed by November 1, 1929, or forfeit $10,000. The Argus Gas Co. undertook to finance the pipe line project, and to that end employed the engineering firm of Brokaw, Garner & McKee, of New York, and the writer, to make an estimate of natural gas reserves for eastern bankers. A deal was made with the Moody-Seagraves interests to take over the construction of the pipe line and distributing system, thus relieving Messrs. Lee, Hardendorf and others, from further financing. Moody-Seagraves then formed the Argus Production Co. for development work in the gas field.

Realizing the possibilities of a major gas reserve the Moody-Seagraves interests soon set about acquiring natural gas franchises for a major 24-inch pipe line from Hugoton, Kans., to Omaha, Neb. The Missouri Valley Pipe Line Co. was formed to build this line, and the Missouri Valley Gas Co. (D. B. Cogswell, president) to distribute the natural gas. However, the pipe line and the distributing units were later sold to a group of interests that were planning to draw natural gas from the Amarillo Field for Omaha, Chicago, Indianapolis, and possibly the Twin Cities. These gas lines are now being laid. The Moody-Seagraves interests, however, retained the Argus Production Co. (now the Western Production Co.), which is prosecuting an aggressive development campaign under the immediate direction of B. A. Hardey, formerly in the Monroe, La., gas field for the Moody-Seagraves interests.

This development has to date proven very successful. To date there has not been a single dry hole drilled in the field. The 1930 program will be finished by November 1, when it is expected 83 gas wells will have been completed by the Argus Production Co. As of September 15, the Argus Production Co. has 59

(Continued on Page 323)



Report of the Bureau of Mines for 1929

Final Summary of Petroleum, Petroleum Products and Natural Gasoline. First Billion-Barrel Year in Production

By Charles E. Kern

Washington Bureau, The Oil and Gas Journal

WASHINGTON, D. C., Sept. 29.—The final summary of petroleum, petroleum products and natural gasoline for 1929 prepared under the supervision of G. R. Hopkins, Petroleum Economics Division, Bureau of Mines, has been completed. The report made up from the annual canvass of producing and pipe line companies shows the production of crude petroleum in the United States during 1929 amounted to 1,007,323,000 bbls. which figure is in excess of the amount shown by the preliminary report to the extent of about 1,250,000 bbls.

First Billion-Barrel Year

"This figure constitutes a new high record and represents the first 1,000,000,000-bbl. year, compared with 1928," states G. R. Hopkins, under whose supervision the report was prepared. "It represents a gain of 105,849,000 bbls. or 12 per cent. In addition to the output of crude, 52,271,000 bbls. of natural gasoline and 3,055,000 bbls. of benzol were produced and 108,710,000 bbls. of crude and refined oils imported, making a total new supply of 1,171,359,000 bbls. Stocks of all oils increased 68,156,000 bbls. during the year as compared with an increase of 22,782,000 bbls. in 1928. Exports of all oils amounted to 163,120,000 bbls., which, when deducted from total demand, gives an indicated domestic demand for all oils of 940,083,000 bbls. This represents an increase over 1928 of 9 per cent."

Changes From Early Report

Important changes of figures in this final report compared with preliminary statistics that have been made public follow:

Total crude stocks east of California, including producers' stocks, increased from 374,874,000 bbls. at the beginning of the year to 387,396,000 bbls. on hand December 31, 1929. Nearly half of this increase of roughly 12,500,000 bbls. occurred in refinery stocks. In California the increase in crude output progressed even faster than in the remainder of the country and stocks of crude, including fuel, were increased by over 36,000,000 bbls.

After falling off for two successive years, there was a decided increase in drilling activity in 1929. Oil wells completed increased from 12,526 in 1928 to 15,572 in 1929; gas wells, from 2,727 to 2,870; and dry holes from 7,078 to 7,914. August was the peak month for drilling, with 2,662 wells completed.

Total Value of Crude

The total value of the crude petroleum produced in 1929, as compiled from a special canvass of purchasing companies, amounted to $1,280,417,000, the highest total recorded since 1926. This represents an average of $1.27 per barrel as compared with an average of $1.17 in 1922. This increase was somewhat unexpected, considering the material increase in production, and resulted primarily from higher prices paid for crude in Texas, exclusive of the Gulf Coast and in California.

"The crude produced in these two districts over half of the total output in 1929, rose 18 cents and 11 cents in average value, respectively, in that year. These increases were mainly responsible for the 10-cent gain in national average. A comparison of the average values, as submitted by the purchasers, with the record of posted prices shows that the price increase of May 20-22 was largely responsible for the gain in values. This increase, which was fairly general throughout the country east of California, more than made up for the price decreases posted late in January.

"Except for Alaska, where the scarcity of crude attaches an unusually high value to the small quantity produced, only two states, Michigan and New Mexico, had a lower average value in 1929 than in 1928. The average price paid by New York purchasers, $3.90 per barrel, was the highest in the country; that in West Texas, 83 cents, the lowest."

A survey of companies engaged in gathering crude oil from wells showed that on December 31, 1929, there were

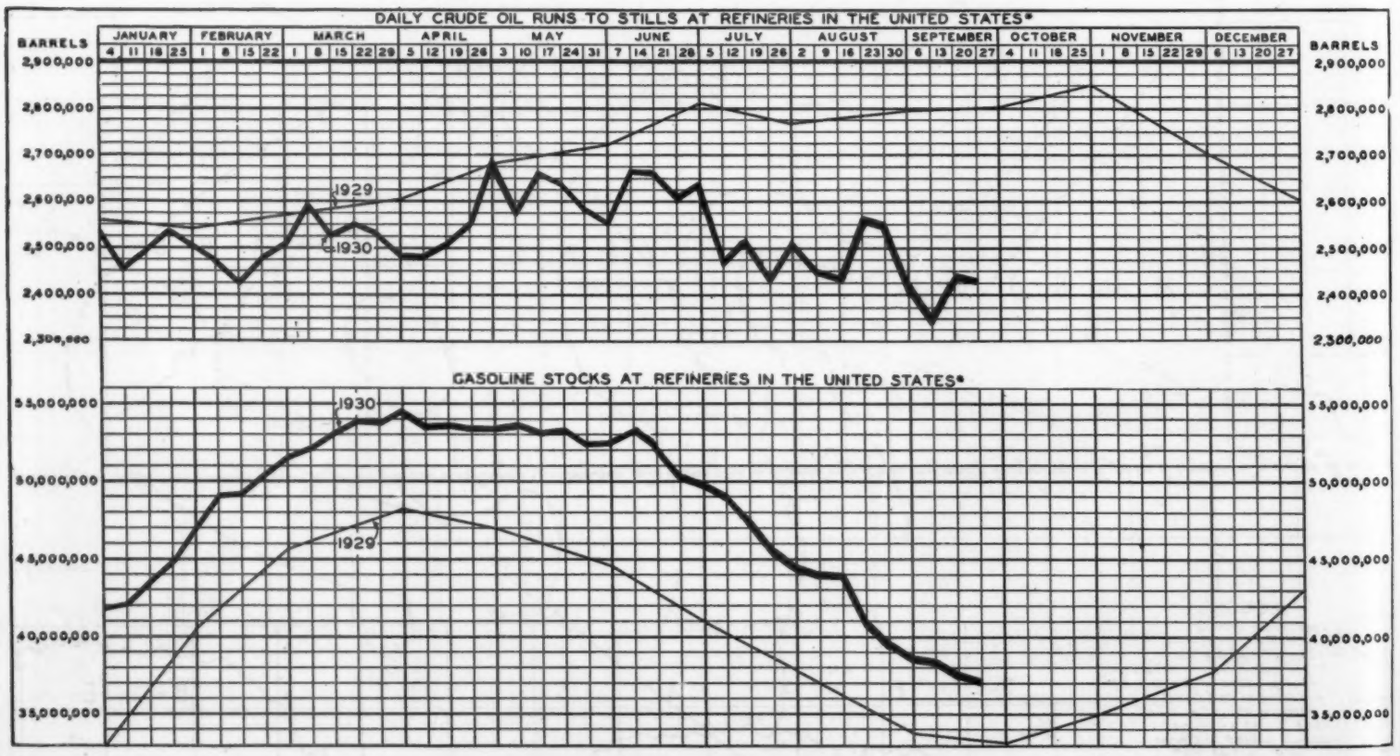
(Continued on Page 360)

AMERICAN PETROLEUM INSTITUTE WEEKLY REFINERY STATISTICS

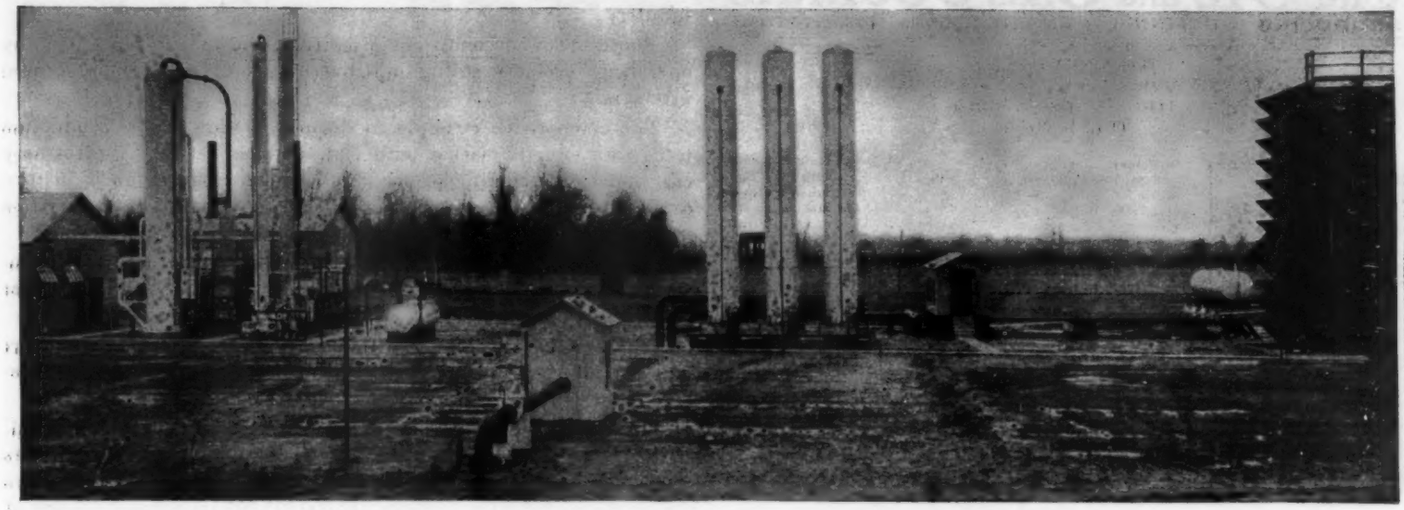
The weekly report made to the American Petroleum Institute on refinery statistics—crude runs to stills, gasoline stocks and gas and fuel oil stocks in barrels—for the week ending September 27.

	Week ending September 27				Week ending September 20				Week ending January 4			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
East Coast	100.0	508,100	5,301,000	11,562,000	100 0	456,700	5,492,000	11,341,000	100 0	464,857	5,998,000	7,431,000
Appalachian	91.8	82,000	1,079,000	1,115,000	91 8	93,300	1,091,000	1,125,000	91.6	75,571	1,282,000	805,000
Indiana, Illinois, Kentucky	99.6	288,300	5,558,000	4,419,000	99.6	303,600	5,542,000	4,443,000	98.6	289,800	5,483,000	3,505,000
Oklahoma, Kansas, Missouri	89.3	254,400	2,470,000	4,855,000	89 3	265,300	2,524,000	4,881,000	87.7	263,428	3,604,000	3,277,000
Texas	90.4	595,100	5,969 000	10,651,000	90 4	579,600	5,695,000	10,719,000	90.7	539,857	6,590,000	13,757,000
Louisiana and Arkansas	96.8	164,300	1,270,000	2,160,000	96.8	158,400	1,117,000	2,094,000	96.8	160,000	2,161,000	4,499,000
Rocky Mountain	93.6	55,900	1,813,000	1,125,000	93.6	52,300	1,832,000	1,187,000	93.3	41,614	2,273,000	973,000
California	99.3	553,600	13,762,000	104,892,000	99.3	531,700	13,967,000	104,586,000	99.3	642,857	14,826,000	109,770,000
Total United States	95.6	2,501,700	37,222,000	140,779,000	95.6	2,440,900	37,260,000	140,376,000	95.4	2,468,285	42,217,000	144,017,000
Texas Gulf Coast	100.0	453,300	4,786,000	7,798,000	100.0	440,700	4,498,000	7,867,000	100.0	429,585	5,579,000	10,792,000
Louisiana Gulf Coast	100.0	115,600	1,011,000	1,427,000	100.0	108,300	836,000	1,377,000	100.0	108,514	1,877,000	3,818,000

(1) Per cent of refinery capacity represented. (2) Daily crude runs to stills. (3) Gasoline stocks. (4) Gas and fuel oil stocks.



Data for 1930 based on weekly reports of the American Petroleum Institute. Data for 1929 derived from monthly reports of the Bureau of Mines, Department of Commerce. Figures for last week not shown in graph but are included in above tables.



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- Recovery of natural gasoline *(high or low pressure)*
- Recovery of refinery vapors
- Rectification of gasoline

THE plant illustrated here is handling 30,000,000 cubic feet of gas daily at 400 pounds pressure. Specification gasoline is the product from the rectifier. The unit is operated under full automatic control.

Southwestern, thru its Research Department, has spent many months in experimental work on rectification, rejecting many methods in favor of the one finally adopted and resulting in a plant in which very precise fractionation is possible combined with great flexibility and ease of control.

Our experience is at your disposal. We suggest that you send for our book on rectification.

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The OIL and GAS JOURNAL

PRODUCING REFINING ENGINEERING MARKETING

Published Weekly by
THE PETROLEUM PUBLISHING COMPANY
114-116 West Second Street
TULSA, OKLA.

Established as an International Publication in 1910 by Patrick C. Boyle.

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A Vast Majority of these Lines are DRESSER Coupled!

A very comprehensive idea of the enormous mileage of natural gas pipe lines operating in the Pittsburgh district is given in the accompanying illustration.

A vast majority, possibly in excess of 90%, of these lines are Dresser Coupled and some of them have been in service for nearly forty years.

S. R. Dresser Manufacturing Company
Bradford, Pennsylvania

DRESSER COUPLINGS DOMINATE

Use Petroleum Coke As Refinery Fuel

Large Quantities Used Economically at Port Arthur Works of The Texas Company in Firing Boilers

By Frank L. Wallace
The Texas Company*

Within the past few years industrial operators and householders alike have found a fuel of pronounced efficiency in petroleum coke, the solid residue formed by the destructive distillation of petroleum products. The Texas Company, which is using petroleum coke in many of its own refineries and power plants is now marketing this product.

Petroleum coke has an extremely high heating value and a low ash content, 75 tons of the substance being equivalent in heating value to 100 tons of the average run of mine coal. Moreover the product leaves less than 1 per cent ash by weight.

Two Classes of Coke

There are two general classes of petroleum coke, one made from residue oils under atmospheric pressure, generally called "coke still" coke, and the other produced in pressure or cracking equipment. Its appearance is similar to the coke made from coal in the conventional coke oven; it has the same porosity and it ranges in color from gray to black.

Carbon, in various combinations with other chemicals, is the principal constituent of practically all fuels. Petroleum coke is regarded as the purest form of industrial carbon available in large quantities. Due to its purity and its high percentage of fixed carbon it is adaptable to many uses as an oxidizing or reducing agent; it is used for making carbon electrodes, such as are used in electric furnaces, and it is also employed in the manufacture of calcium carbide, metal alloys and artificial gas, but its widest use is for domestic or industrial fuel.

*Second assistant superintendent, Port Arthur, Tex., refinery. Article will appear in October issue of the Texaco Star.

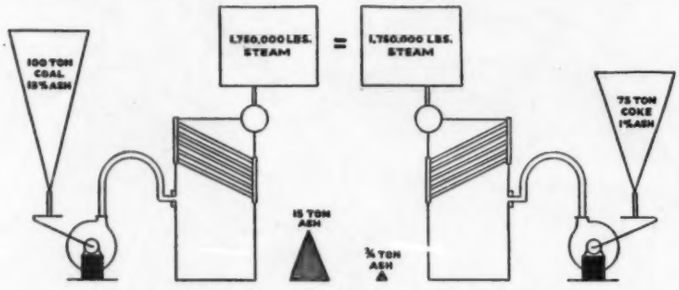
In the home petroleum coke is usually burned in egg-sized lumps, but for industrial purposes it is more often pulverized. It is in the pulverized form that the most exhaustive tests on petroleum coke have been conducted by The Texas Company at its Port Arthur works, Port Arthur, Tex.

Pulverized Fuel

The coke when used as pulverized fuel is prepared by two different methods; the centralized system, where the coke is crushed, dried and pulverized at a central point and distributed to the various units of consumption, and the unit system where the coke is delivered to the units of consumption in lumps 1½ inches in diameter and smaller. This crushed coke is fed into a unit mill which dries and pulverizes the fuel and delivers it to the furnace.

The first unit mill installation by The Texas Company was made in 1927 under a 524 horsepower boiler at the company's Port Arthur works. Seven additional mills have since been added to similar boilers which were originally fired by oil and four ball mills have been installed to fire four 640 horsepower boilers. The combined installation has a capacity of 500 tons of pulverized fuel every 24 hours.

The equipment in this plant for burning pulverized petroleum coke differs very little from that used in firing coal in pulverized form. The raw coke is delivered to the boiler house in railway gondola cars and is unloaded into a 250-ton storage bin. Thence the coke is conveyed to intermediate bins at each of the 12 boilers. On its way to the boilers the coke travels over magnetic separators, which remove all "tramp" iron, and then passes through a single roll crusher which reduces the lumps to about three-quarters of an inch in diameter. Only one operator is needed to deliver the coke from the main storage bin to the intermediate bins. After the prepared coke is delivered to the intermediate storage bins above the pulverizers, the operating fireman controls the feed into the mills and controls his fire in accordance with the steam demand in the same manner as he would if he were using any other fuel.



Comparative values of bituminous coal and petroleum coke.

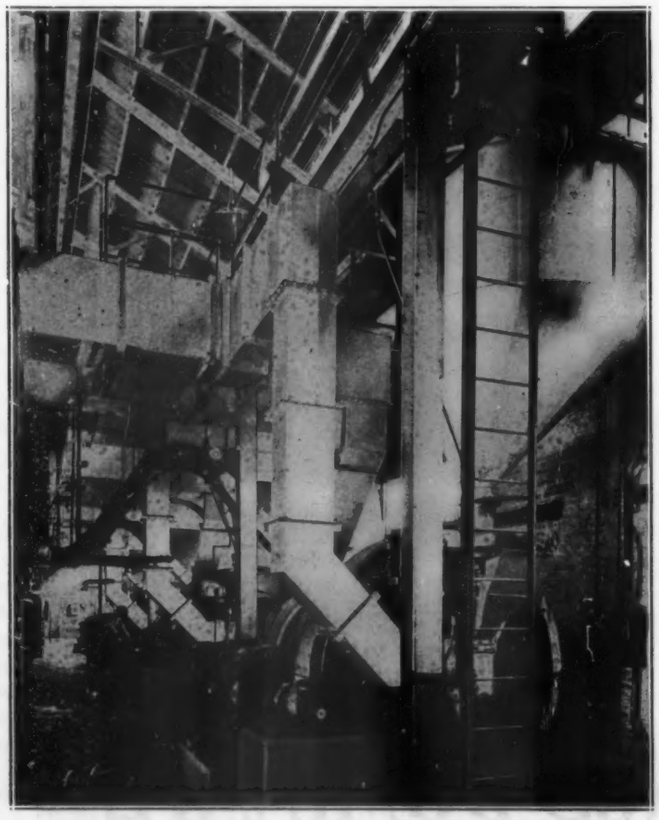
Removing Moisture

The coke, as it enters the mills, contains from 2 to 15 per cent moisture, depending on the weather. In order to pulverize the coke properly, the moisture must be reduced and this is accomplished by the use of preheated carried air in the mills. This air, which has been heated by being used to cool the walls of the furnace, or else by an extraction from the furnace gases, absorbs the moisture from the coke as it is ground and blown the coke into the furnace through horizontal turbulent burners. Secondary air; that is, air that is used in actual combustion, is supplied after being heated by passing through the boiler settings, or walls of the furnace. Ignition takes place close to the burner tip and the temperature of the flame is somewhat higher than the flame of burning coal or gas.

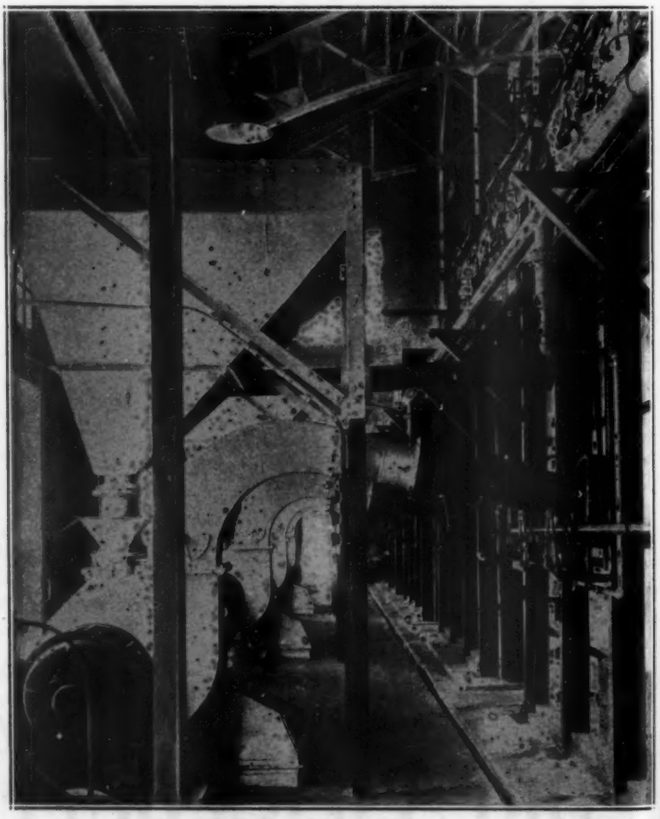
No Ash

Since petroleum coke leaves so little ash, it has not been necessary to provide ash pits under the furnaces. The last four boilers constructed for burning coke have been in continuous operation for six months and the furnaces are quite free from ash or slag formation. Some "fly ash" is carried over through the boiler and breeching (the pipe from the boiler to the stack) but this condition is taken care of by extracting the

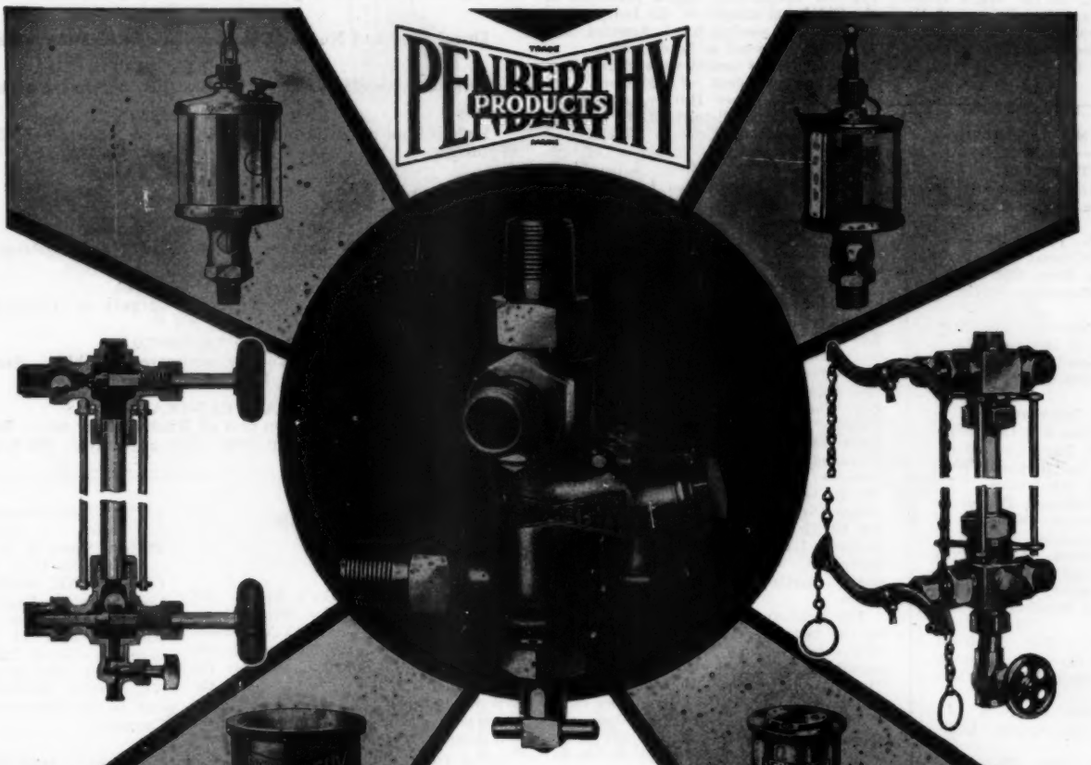
(Continued on Page 360)



Firing aisle showing Ball mills, pulverized coke and hot air piping; coke bin and feeder can be seen in right foreground.



Close up of impact mill installation at Port Arthur, Tex., refinery of The Texas Company, showing arrangement of overhead conveyors, coke bin, feeder, burner piping and hot air ducts.



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It stands out plainly enough when Penberthy Products are compared in the stock room with the general run of steam specialties, liquid level gauges, and lubricating devices.

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PENBERTHY INJECTOR COMPANY

ESTABLISHED IN 1886

DETROIT

CANADIAN PLANT WINDSOR, ONT.

OKLAHOMA OPERATORS ORGANIZE TO KEEP UP FIGHT FOR TARIFF ON OIL

The fight for a tariff on oil imports received fresh impetus Monday of this week when independent oil operators of Oklahoma, meeting in the Mayo Hotel, Tulsa, organized a state chapter of the Independent Petroleum Association of America and officers of the Oklahoma State Chamber of Commerce, meeting in the hotel at the same time, discussed the practibility of an oil tariff.

James G. Cloud, a director of the Sunray Oil Corp., was chosen president of the Oklahoma chapter of the Independent Petroleum Association of America and Tulsa was selected as headquarters.

Other officers named were Frank Buttram, vice president, of Oklahoma City district; W. Elmer Harber, vice president of Seminole district; J. B. Nichlos, vice president of Chickasha district, and Peyton Brown, vice president of the Blackwell district. Four other vice presidents will be named by the board of directors.

Dudley C. Monk, Tulsa, was elected secretary, and George A. Dye, treasurer.

Directors Chosen

Directors for the organization were named as follows: E. L. Mayes, A. Danciger, J. R. Simpson, Paul S. Ache, Fred T. Hildt, Earl Sneed, Olney Flynn and Pat Malloy, all of Tulsa; W. R. Ramsey of Oklahoma City; W. A. Wise and Sam T. Allen of Sapulpa; Robert Kerr and R. A. LaSalle of Ada; A. C. Trumbo and R. E. Kershaw of Muskogee; J. B. Milam, Chelsea; Harry H. Diamond, Holdenville; C. C. Harmon, Nowata; E. P. (Tex) Jones, Okmulgee; W. E. Grbso, Seminole; Sid Delplane, Ponca City; S. S. Orwig, Wewoka; Hilton Phillips, Shawnee; J. G. Lyons, Okmulgee; Knox Garvin, Duncan; J. A. Patterson, Wewoka; Clarence Burlingame, Bartlesville, and Fred Coogan, Sayre.

The fight to have an oil tariff imposed by the last session of Congress was reviewed by Harold B. Fell, executive vice president of the national association. "Imports have not been properly reduced," said Mr. Fell. "Importing companies have been asked to reduce the amount of crude oil and refined products brought into the United States in proportion to the proration schedules throughout the oil producing states, but the plea has had no results."

Industry Declared Sacrificed

Mr. Malloy declared that the oil industry of the United States is being sacrificed for the advantage of foreign companies. "American operators will have reduced the yield of crude oil by the end of the year almost 100,000,000 bbls., gasoline consumption increased almost 10 per cent, crude oil to stills cut almost 50,000,000 bbls. during the current year, and still the market is sick," he said. "What is the answer? Crude oil is 19 cents to 40 cents below prices of 1929. And the Standard Oil Co. of New Jersey announces a cut in gasoline and kerosene prices. The answer is not read in domestic producing companies but in the overwhelming balance of imports of crude oil and refined products. American capital is being exported and is being used to exploit the virgin resources of the world and import the raw material."

Protariff Emblems Urged

Mr. Flynn suggested that filling stations throughout the country display a flag or some other emblem to show that they are supporters of the effort to obtain an oil tariff. He advocated the use of stickers and buttons by buyers of gasoline.

"I would hesitate to say what chance there is of passing a tariff at the next session of Congress," said Congressman Charles O'Conner, representative from the First Oklahoma district, "but I do feel that the time may come soon when the idea of protection must be done away with and a fight waged for an absolute embargo on crude oil and its refined products."

Harry H. Rogers, president of the Oklahoma State Chamber of Commerce and president of the Exchange National Bank of Tulsa, declared he was in favor of a protective tariff on oil and its products and said the issue was an economic, not a political one.

Wirt Franklin, president of the national association, was unable to be present.

OIL MAN'S CALENDAR

OCTOBER

2—Tulsa, General Committees, A.P.I. Divisions of Production and Marketing.

2—Pittsburgh, Pa., joint meeting, A.P.I. Divisional Committee on Safety, Wm. Penn Hotel.

2-3—Tulsa, Petroleum Division, A.I.M.E.

3—Tulsa, General Committee, A.P.I. Division of Refining.

3—Tulsa, Board of Directors, American Petroleum Institute, Mayo Hotel.

4-11—Tulsa, International Petroleum Exposition and Congress.

6—New York, Bureau of Explosives. Hearing on proposed revisions to freight regulations.

6-8—Tulsa, National Petroleum meeting, American Society of Mechanical Engineers.

6-11—Washington, D. C., sixth International Road Congress.

6-11—Washington, D. C., Exhibition, American Roadbuilders Association.

13-16—El Paso, Tex., Regional meeting, A.I.M.E., and Western Division, American Mining Congress.

13-17—Atlantic City, N. J., American Gas Association, Auditorium.

14-16—Kansas City, Mo., Convention, Big Four State Jobbers.

15—Madison, Wis., Wisconsin Petroleum Association.

16-25—London, England, Olympia Motor Show.

17—Los Angeles, Calif., Pacific Coast meeting, Petroleum Division, A.I.M.E.

20-22—St. Louis, Mo., Petroleum Refiners division, National Association of Credit Men.

22-24—Pittsburgh, Pa., transportation meeting, Society of Automotive Engineers.

23-24—Mineral Wells, Tex., convention, Texas Petroleum Marketers Association.

29-31—Lawrenceville, Kans., celebration twenty-fifth anniversary, Lawrence County Oil Industry.

NOVEMBER

2-5—St. Louis, Mo., Marketing Congress, Independent Oil Men of America, Statler Hotel.

6-11—Berlin, Germany, International Automobile Show.

10-13—Chicago, eleventh annual meeting, American Petroleum Institute, Stevens Hotel.

13-14—Chicago, American Oil Chemist's Society, Congress Hall.

DECEMBER

1-5—Memphis, Tenn., ninth annual Asphalt Paving Conference, the Asphalt Institute and Association of Asphalt Paving Technologists.

2-4—Omaha, Neb., convention, Nebraska Independent Oil Men's Association, Paxton Hotel.

8—New Orleans, La., American Institute of Chemical Engineers.

JANUARY

3-10—New York, National Automobile Show.

24-31—Chicago, National Automobile Show.

FEBRUARY

16-21—San Francisco, Calif., National Western Metal Congress and Exposition.

High Spots in Field News

KANSAS
Large wells found in Eastborough Pool.

OKLAHOMA
Big wells on west edge of Oklahoma City Field.

SOUTHWEST TEXAS
Duval, Bee and Nueces Counties have interesting tests.

GULF COAST
First commercial well at Mykawa, just southeast of Houston.

ROCKY MOUNTAIN AREA
Hobbs Pool potential 600,000 bbls. New black oil field on Garland Dome, Wyoming.

WEST TEXAS
Fuhrman well in Andrews County has 3,500 feet of oil and may open new pool.

NORTH LOUISIANA-ARKANSAS
Two tests started and third projected for deep drilling in Smackover and El Dorado.

CALIFORNIA
Substantial decline in production, largely at Elwood. Playa Del Rey leads completions.

PANHANDLE
Wildcat in Coleman County estimated 40 bbls. Semiwildcat in Gray County made initial of 500 bbls. an hour.

EAST CENTRAL TEXAS
Much activity depends on test of Rusk County well. Broderick & Calvert get one of best wells in Van Pool. Carroll district limited on northeast.

Late Fields

KANSAS

Phillips Petroleum Co.'s No. 1, NE cor. NW, Section 6-12-17w, Ellis County, found pay sand at 3,660-3,712 feet, where oil rose 2,200 feet in the hole in 24 hours. The well swabbed and made 13 bbls. the first 4 hours. The owners estimate the well at 100 bbls. a day. The big pipe is being pulled preparatory to putting the well pumping.

Derby Oil Co.'s No. 1, in Section 25-17-10w, a wildcat in the southwestern part of Ellsworth County, had sand at 2,893-2,991 feet, where the well first gauged 16,000,000 feet of gas. The gas decreased to an estimated 2,000,000 feet. It is being bradenheaded by landing the casing in the sand. The test is drilling deeper at 3,015 feet.

Tatlock and Atlantic Oil Producing Co. and others' No. 1, in the SW cor. NW SE, Section 22-20-10w, Rice County, had a showing of oil and a hole full of water in sand at 3,335-41 feet. It was being underreamed to drill deeper. The test is a half mile east and a quarter mile south of the present production in the Schurr Pool in Rice County.

Another new location was announced for a test east of production in the Schurr Pool in Rice County by the Atlantic Oil Producing Co. for No. 1 Kelly, SW cor. SE NW, Section 22-20-10w. The test is a quarter mile east of the gas well recently completed by C. B. Davis, which was shut in for a 5,000,000-foot gas well at 2,593 feet.

The possibility of extending the Eastborough Pool in Sedgwick County to the south was ended when the Six Forty Oil Co. and others' No. 1 Braley Airport, SE cor. SW NW, Section 6-28-2, found a hole full of water in the deep sand. The test found sand at 3,340-77 feet and at 3,377-85 feet, and at 3,388-98 feet, and at 3,398-3,412 feet with nothing showing. The water was found in sand at 3,412-26 feet, where it is shut down.

Derby Oil Co.'s No. 2 Eastborough CEL SW NE, Section 19-27-2, Sedgwick County, in the Eastborough Pool, flowed 515 bbls. the first 21 hours and 1,350 bbls. the next 24 hours. The oil was found in chat at 2,974-93 feet.

Western Producing Co.'s No. 3 fee, C NE, Section 24-32-38w, is a new location in the northwestern part of Stevens County.

OKLAHOMA

Oklahoma operators petitioned the Oklahoma Corporation Commission to extend the present proration plan for another 10 days from October 1. It is expected the new proration plan, which is being considered, will be ready by October 10. The state-wide proration

(Continued on Page 366)

RULING OPPOSED BY TEXAS COMPANIES

Oil companies with natural gasoline plants are opposing the efforts being made in Texas to collect back taxes on production due to a recent interpretation of the attorney general's department.

Attorney General Robert Lee Bobbitt recently held that natural gasoline obtained from casinghead gas of oil wells in the State was subject to the state's gross production tax on the same basis as crude oil. Heretofore no gross production tax has been imposed upon casinghead gas.

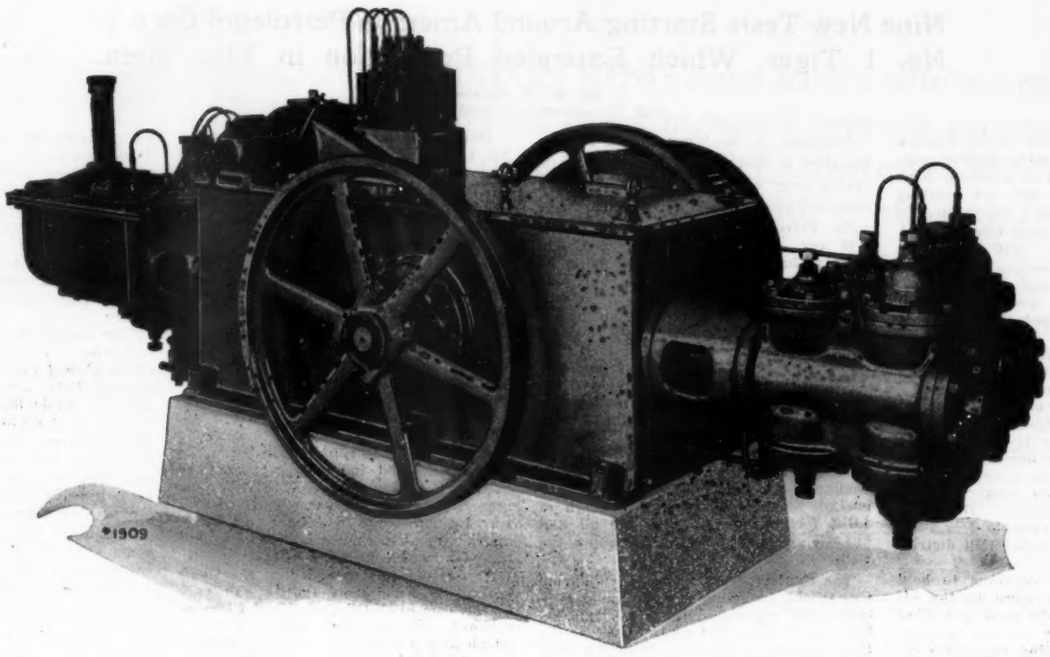
State officials have announced that they will attempt to collect back taxes starting in 1916. It is estimated that this tax will total $2,500,000. Oil companies have asked for a conference with the attorney general regarding the ruling.

SCORE SHEET ON OIL PRODUCTION

Below is shown allotted average daily production in the United States, April to December, inclusive, suggested by the Committee on Economics of the Federal Oil Conservation Board, and the actual daily average production during the week ending September 27:

	Allotted (bbls.)	Actual (bbls.)	Over (bbls.)	Under (bbls.)
California	610,000	589,750	.....	20,250
Oklahoma	655,000	558,525	.....	96,475
Texas	750,000	763,574	13,574	.....
Other fields	480,000	470,368	.....	9,632
Total	2,495,000	2,382,217	13,574	126,357

Net underproduction 112,783 bbls. per day.



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Los Angeles, California

E. L. WILSON HARDWARE CO.
Beaumont, Texas.

NATIONAL TRANSIT
Pump & Machine Co.
Oil City, Pa.

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CLEVELAND HOUSTON TULSA LOS ANGELES

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REEVES & SKINNER MACHINERY CO.
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Phoenix, Ariz.

WOODWARD, WIGHT & CO.
New Orleans, La.

Carr City May See Drilling Campaign

Nine New Tests Starting Around Amerada Petroleum Corp.'s No. 1 Tiger, Which Extended Production in That Area

By W. A. Spinney
Staff Correspondent, Oklahoma Fields

The Carr City district in the Greater Seminole area has an active drilling campaign in prospect. Nine new tests are starting around the Amerada Petroleum Corp.'s No. 1 Tiger, NW cor. NE SW Section 3-8-5, which extended production in that area. The well swabbed 282 bbls. the first nine hours from the Wilcox sand at 4,036-40 feet. It was shut down for additional tankage.

New work in the north and northeast sections of the Oklahoma City Pool was getting under way at the beginning of the week, with nine new locations reported. This increase in activity follows the discovery of gusher wells in areas expected by the operators. It is believed that all the available leases on the city lots in the Capitol Hill district have been taken.

Oklahoma operators continue to hold the State's production close to the allowable mark set by the state proration committee. The daily average production for the week ending September 27 was approximately 559,000 bbls.

Revised schedules for the proration of the flush fields in Oklahoma were being worked out by the state-wide committee. The new schedules were not made public but it is believed the State Corporation Commission will be asked to extend the present order. Operators have delayed asking for a new order to cover the last three months of the year hoping the State Supreme Court would give its decision on the legality of the conservation laws.

The Tatums Pool in Carter County is southern Oklahoma continues to be active. The west and southwest edges of the pool are looking much better for production.

Three New Producers in Tatums

During the last week three new producers were added to the southeast extension of the Tatums Field. These new wells had an initial 24-hour gauge of 3,024 bbls. of oil. The area is still active and seven other tests are expected to reach the pay horizon during the next few days. It is believed the east boundary has been found in the extension area by the Magnolia Petroleum Co.'s No. 1 Dickerson, NW cor. NE SE, Section 24-1s-3w, which was drilling below 3,450 feet with nothing showing. Nearby tests have found production in sand from 2,000 to 2,500 feet, but this test failed to get a showing of oil at this depth.

Another producer was completed on the northeast edge of the field. the Amos Drilling Co.'s No. 1 Hooks, SE cor. SW SE, Section 13-1s-3w. It failed to show up for as good a well as was expected and made by swabbing and flowing 216 bbls. of oil the first 24 hours. During the first six hours it made 125 bbls. Production is coming from sand at 2,131-61 feet, and from 2,170-2,215 feet. The total depth is 2,276 feet. Magnolia Petroleum Co.'s No. 8 Gill, SE cor. NE, Section 23-1s-3w, near the old production in the area, swabbed 718 bbls. the first 24 hours and then started flowing and made 601 bbls. the second 24 hours. Production is coming from a series of sands at 2,261-2,550 feet.

The largest well of the week was completed by Wirt Franklin Petroleum Corp., its No. 3 J. Hooks, SE cor. NW NE, Section 24-1s-3w, on the east edge of the area. The well flowed 2,090 bbls. the first 24 hours, making it one of the largest producers completed in the extension area. Production was found in a series of sands at 1,996-2,085 feet. It has been shut in for proration.

Proration in the Cement Pool reduces the flow in that area. The pipe line is taking only about 30 per cent of the potential production from the area. Magnolia Petroleum Co.'s No. 5 Hedlund, NW cor. NE, Section 11-5-9w, Caddo County, has cemented 9-inch casing at 4,511 feet. The test was showing gas from sand at 4,513-38 feet, which will be tested when the cement plugs are drilled. The same company's No. 3 White, SW cor. SE, Section 25-6-10w, was bailed dry with nothing showing after drilling the cement plugs at 3,405 feet. Sand was found from 3,412-22 feet and the total depth is 3,423 feet. The test is shut down. Mid-Kansas Oil & Gas Co. and Ramsey Petroleum Co.'s No. 2 Surbeck, NW cor. SW SW, Section 2-5-9w, on the east side of the pool, is shut down at a total depth of 4,016 feet, with a showing of oil and an attempt may be made to pump the wells.

The total recovery from the Oklahoma City Field, including the gauges of September 30, was approximately 33,000,000 bbls. of oil from 550 wells. It gives the field an average recovery of 60,000 bbls. per well, which is still under the cost of development. It is estimated that development costs have been $150,000,000 for this number of wells. Some express the opinion the wells have been drilled too close together, especially in the north end of the pool. For example, on the NE NW 10 acres of Section 14-11-3w, six wells are being drilled, allowing less than an acre and a half for each well. It has been estimated that at least 110,000 bbls. recovery is necessary to pay back the cost of development, and some assert it is doubtful if these six wells will make a total recovery of 660,000 bbls. necessary to pay for the drilling costs. The discovery well, drilled in the center of 40 acres, shows a recovery of about 1,200,000 bbls. to date. It was completed December 4, 1928.

During the last week Skelly Oil Co.'s No. 1 Hurt, SW cor. NW NW NW Section 2-11-3w, was completed, making 5,717 bbls. the first hour and 40 minutes. This enormous well was completed at the eastern edge of the city limits, only a mile from the intersection of Broadway and Main Streets, which is considered the center of the business district. After cutting the connections it was brought under complete control, but for a while threatened to blow wild. The well was flowing at the rate of 80,000 bbls. a day, a greater flow than the Hall & Briscoe No. 5 Holmes, completed several days earlier, and was believed to be the largest well completed in the field. The sand started cutting the connections after the well was shut in to tighten the connections, and the master gates were damaged. Some of the oil was sprayed into the air by the gas volume, which was estimated at 45,000,000 feet. The district for more than a half mile around the well was blocked as a safety measure.

Production was extended in the Oklahoma City Field more than a half mile by the Tom Slick Oil Co.'s No. 1 Classen-Edwards, SE cor. SW Section 3-11-3w, which flowed 1,627 bbls. the first 30 minutes, 2,341 bbls. the first hour, 2,232 bbls. the second hour and 2,415 bbls. the third hour. The gas was estimated at 80,000,000 feet. The well made 13,933 bbls. the first six hours and was then shut in on account of the lack of storage. The Wilcox sand was found at 6,323-6,470 feet.

May Mean Another Pool

Completion of the Mid-Kansas Oil & Gas Co. and Ramsey Petroleum Co.'s No. 1 Messer, SW cor., Section 32-14-3w, a wildcat north of the Oklahoma City Pool in Oklahoma County, and 2½ miles west of Edmond, is believed to add another pool to the county, the second opened by these firms in that area. The well has been making around 450 bbls. a day after the second shot and the crew was still cleaning out. The first pool found by the companies was east of the main Oklahoma City Pool, at Nicoma Park, where the discovery well in Section 19-12-1w is still making around 200 bbls. a day. The well west of Edmond is the result of structure worked by the Ramsey Petroleum Co.'s geologists. The company has a block of about 4,500 acres in which a half interest was sold to the Mid-Kansas Oil & Gas Co. and the wildcat well was started in April, 1930.

The corrected tops of the different formations found in the well were Checkerboard lime at 5,367 feet, Oswego lime at 6,027 feet, Sylvan shale at 6,304 feet, Viola lime at 6,410 feet, Simpson series at 6,445 feet and Wilcox sand at 6,696 feet. The total depth is 6,771 feet. Some express the opinion the Wilcox sand may be 250 feet thick in the area, it being penetrated only 75 feet at the present time.

The other wildcat tests in the Oklahoma City district were not showing to advantage. Prairie Oil & Gas Co.'s No. 1 Dills, SE cor. NW, Section 17-13-3w, about 4 miles south of the Mid-Kansas Oil & Gas Co.'s test, has been plugged back to 6,190 feet where the casing was ripped. The casing will also be ripped at 6,250 feet, where it is believed the gas was found when the test was drilling. The company expects to complete the well for a gas well.

Ryan Consolidated Petroleum Corp.'s No. 1 Lawton, NE cor. NW, Section 3-11-2w, a wildcat east of the Oklahoma City Field, was drilled to a total depth of 6,903 feet, where water was found and after being plugged back to several different levels and shot, it was preparing to pull the casing and abandon after it had been tested several times.

New Producing Area in Hughes County

Mid-Continent Petroleum Corp.'s No. 1 Tiger, SE cor. SW NW, Section 9-7-8, Hughes County, opens a new producing area in the county. The well made 500 bbls. the first nine hours from the Booch sand at a total depth of 2,906 feet, and is about 6 feet in the pay horizon. The gas volume was estimated at 15,000,000 feet. The operators may drill the well slightly deeper before completing.

The northwestern tier of counties in Oklahoma is expected to receive the next wildcat play and it is the belief of students of the industry that the next big development may get under way during the next two years in that area. Lease and royalty buyers have been active in the different counties for the last few years. Both the independents and the major companies are holding checkerboard acreage and large block of leases which gives indication that when the drilling development starts it will be one of the most orderly campaigns in the history of the oil industry. Following the land men have been crews of geologists, geophysical crews and map makers.

It is estimated that more than 200 blocks of leases have been obtained in these counties, most of these being held by major oil companies. Indian Territory Illuminating Oil Co. has more than 65 of these blocks scattered through the counties, together with a few in the southwestern part of the State. The trend of development is expected to extend in a northwesterly and southwesterly direction from Oklahoma City, and continue west across the Oklahoma Panhandle. Other companies holding numerous blocks in these areas are Tom Slick Oil Co., Shell Petroleum Corp., Gypsy Oil Co., Sinclair Oil & Gas Co. and Prairie Oil & Gas Co.

In Harper County the deepest test in the State has been drilled and after being

(Continued on Page 125)

WILDCAT OPERATIONS IN OKLAHOMA

(Descriptions are East and North unless marked otherwise)

NORTHERN OKLAHOMA

ALFALFA COUNTY

Company, farm and location—	Remarks:
Smith Brothers' No. 1 Forbes, SE cor. NW NW Sec. 12-27-11w	Shut down 1,232 ft.
J. W. Bailey's No. 1 Acre, SW cor. NE Sec. 14-24-11w	Rigging up standard tools 4,660 ft.; shut down.

BECKHAM COUNTY

Ray Johnson and J. R. Cuniff's No. 1 Brower, C NW Sec. 29-10-22w	Shut down 3,784 ft.
Producers Exploration Co.'s No. 1 Sidell, SE cor. SW SW Sec. 17-9-22w	Shut down 2,402 ft.
Carson et al's No. 1 Danby, SW cor. SE NE Sec. 20-8-22w	Shut down 1,606 ft.

BLAINE COUNTY

Washoma Oil Co. et als' No. 1 Phillips, C NW SW Sec. 13-19-10w	Drlg. 3,805 ft.; set 6-in. csg.

CADDO COUNTY

Abernathy & Brown's No. 2 Houston, Sec. 24-6-11w	Drlg. 900 ft.
Simms Pet. Co.'s No. 1 Cobsa, SW NW Sec. 24-6-11w	Rig.

CHEROKEE COUNTY

Weaver & Proctor's No. 1 Benge, NE SE Sec. 8-14-21	Shut down 510 ft.

CLEVELAND COUNTY

Harris et al's No. 1 Highbee, SE NW Sec. 20-6-1	Shut down 6,518 ft.
Daniels & Lewright's No. 1 Vandever, C SW Sec. 18-7-1w	Abandoned 3,130 ft.

COAL COUNTY

A. M. Van Orden's No. 1 Jamison, SE SW Sec. 31-1-9	Shut down 1,668 ft.
Blackwell O. & G. Co.'s No. 1 L. Jackson, NW cor. Sec. 26-2-9	Drlg. 4,180 ft.
W. E. McGraw's No. 1 King, C SW NE Sec. 11-1-8e	Shut down 3,030 ft.

COMANCHE COUNTY

Troy & Young's No. 1 Cline, NW NE NE Sec. 8-3-10w	Rig.
Shasta Oil Co.'s No. 1 Romwalt, SW NW Sec. 11-2-10w	Shut down 1,709 ft.
O. W. Stogner's No. 1 Dosbel, C SW SW Sec. 3-3-9w	Shut down 1,450 ft.

GARFIELD COUNTY

E. L. Love et al's No. 1 White, SE cor. NW Sec. 9-24-5w	Fishing 5,721 ft.

GRADY COUNTY

J. V. Bailey's No. 1 Hubbard, C NE NW Sec. 1-10-6w	Shut down 100 ft.

GRANT COUNTY

Bu-Vi-Bar and Amerada's No. 1 Hurst, C SW Sec. 25-26-5w	Drlg. 5,185 ft.
Cowden et al's No. 2 Vollmer, CEL NE SW Sec. 22-25-4w	Shut down 5,640 ft.

GARVIN COUNTY

McMinn et al's No. 1 Carson, NE NW Sec. 5-3-4w	Shut down 3,026 ft.

(Continued on Page 160)

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Kansas Keeping Within Allowed Output

Notwithstanding Large Wells Found in Eastborough Pool
State's Daily Average Production Is Approximately 116,000 Bbls.

By W. A. Spinney
Staff Correspondent, Kansas Fields

Kansas' production averaged approximately 116,000 bbls. a day for the week ending September 27. Production is being kept within the estimated requirements notwithstanding large wells being found in the Eastborough Pool in Sedgwick County. The estimated potential of the Eastborough Pool the same week was 15,000 bbls. a day from 21 wells. This large potential has been built up during the last few months. The area has five deep sand producers and 16 producing from the chat.

The fifth pipe line will enter the Eastborough Pool in Sedgwick County. Magnolia Petroleum Co. announced that a contract has been let for a 4-inch pipe line to the Truman Smith Construction Co. for the construction of a pipe line from the company's tank farm west of Augusta in Butler County, to the Eastborough Pool. The Magnolia Petroleum Co. recently acquired the properties of the White Eagle Oil & Refining Co. and completed its first well in the new pool east of Wichita in the Eastborough Field. It will run the crude oil to its refinery near Augusta. The line is expected to be in operation within the next few weeks.

The twenty-first producer in the Eastborough Pool was the Vickers Petroleum Co. and others' No. 3 Keys, SW cor. NW NE, Section 30-27-2, Sedgwick County. A showing of oil was found in the top of the chat at 2,971 feet. The owners were unable to estimate the production as the pay has only been touched. The well is offset by wells making from 250 to 450 bbls.

Eastborough Operations Extended

Operations in Eastborough Pool are being extended to the west by new locations. In addition to the tests near the western limits of the field the Douglas Avenue Oil Co. is building a rig for No. 1 Bruner, in Section 24-27-1. Blankenship Petroleum Co. recently completed a rig north for a test on the Schott 40 acres in Section 24-27-1.

The Eastborough Pool deep sand production in Sedgwick County was extended more than a half mile in the last week by the E. F. Jones and others' No. 1 Rimel, SW cor. NW SW, Section 20-27-2. It makes the fifth producing well in the deep horizon, and a total of 20 producers in the pool. The well found the Simpson sand at 3,267-69 feet, where oil rose 1,200 feet in the hole in a few hours. A small showing of water was found in the hole and the operators say the water is coming from back of the casing. The well may be drilled deeper before a production test is made. It was drilling deeper at 3,342 feet.

The second well completed in the Eastborough Pool early in the week was the Magnolia Petroleum Co.'s No. 1 Wheeler, C SE SE, Section 19-27-2, and it extended production in the chat a location to the east. The chat was found at 2,952-64 feet, where the well swabbed 10 bbls. an hour. It may be drilled deeper after a production test is made. The production in the field is approximately 1½ miles wide and 2 miles long. Several other wells are expected to be completed during the next few days.

Other tests expected to be completed this week in Eastborough Pool were Producers & Refiners Corp.'s No. 1 Turner, NW cor. SE, Section 30-27-2; Aladdin Petroleum Corp.'s No. 1 Christman, NE cor. SE NE, Section 25-27-2; Syndicate Oil & Gas Co. and Six Forty Oil Co.'s No. 1 Braley Airport, SE cor. SW NW, Section 6-28-2.

Rush County May Have Another Pool

Another western wildcat has a showing of oil in Rush County and it may indicate another oil pool. The oil showing was found in the Oswald lime in the Prairie Oil & Gas Co. and Gypsy Oil Co.'s No. 1 Lieker, NW cor. SW SW, Section 5-16-18w. The Oswald lime was topped at 3,324 feet and the total depth is 3,352 feet, with about 5 or 6 feet of pay and 500 feet of oil in the hole, and no water. Tankage is being erected and a production test made. The nearest production is the Johnson area south of Hays in Ellis County. Rush County has had no oil production, but has several gas wells.

The wildcat test of the Derby Oil Co. and others' No. 1 Heiken, in Section 25-17-10w, Ellsworth County, is to be drilled deeper. The 6-inch casing will be landed on top of the sand at 2,980-91 feet, where the well made 5,000,000 feet of gas, which will be bradenheaded.

The wildcat test of the Midwest Exploration Co. in Stafford County, swabbed 280 bbls. the first 24 hours. The well is No. 36 Richardson, in Section 32-22-12w. The oil was found in the Silicious lime at 3,341-49 feet.

The first offset to the Prairie Oil & Gas Co. and others' No. 1 Davidson, in Section 4-16-11w, Barton County, was the Syndicate Oil & Gas Co.'s No. 1, in Section 4-16-11w, which was spudding. The discovery well was rated as good for 100 bbls. when completed, but it was shut in and is still without a pipe line connection.

No Change Expected in Voshell Pool

It is expected curtailment will remain the same in the Voshell Pool in McPherson County, during October. The area now has an estimated potential of 68,000 bbls. a day from 93 wells. The pipe line outlet for the area is around 10,500 bbls. a day, which means the operators are producing about 14½ per cent of the potential. Some express the opinion the area has more locations to be drilled and that the potential production of the field is likely to remain near the present level for some time.

T. C. Johnson, proration umpire for Kansas, has notified operators in the Voshell Pool that the same schedule will be continued during October unless the operators object. It is believed the gradual increase in the potential is causing a slow decline in the percentage of allowable production.

Lario Oil & Gas Co. and others' No. 1 Ritz, in Section 6-20-1w, McPherson County, east of the Ritz Pool, was preparing to drill deeper from a total of 2,965 feet, where a showing of heavy oil and 5,000,000 feet of gas was found. The test, a semiwildcat, is about a mile from the nearest production. The oil showing was found in the chat formation.

The fourth well completed in the Peasel Pool in Sumner County, was the Carter Oil Co.'s No. 1 Frankum, NE cor., Section 32-21-1w, flowing 127 bbls. from the chat at a total depth of 3,678 feet. It is the largest producer in the pool.

McCulloch Oil Co. and others' No. 1 Lilly, SW cor. NW NW, Section 23-23-5, a wildcat in the northern part of Butler County, was spudding. The new location is on a block of 2,000 acres. The Empire Oil & Refining Co. also has a block in the vicinity of similar size.

Four Drillers to Make Test

The Four Drillers Supply Co.'s No. 1, NE cor., Section 22-27-5, Butler County, on an one-acre tract, had the Bartlesville sand at 2,778-85 feet, where it was shot and oil rose 225 feet in the hole. A swabbing test will be made.

Roth & Farout have started to develop the area surrounding the new well in Section 12-32-4, Cowley County, which is flowing around 21 bbls. a day against a back pressure. The area has been quiet for some time. A new location was announced in the NW cor. SE, Section 12-32-4. Acreage around the well has been leased and other locations may be expected in the near future.

The Hydraulic Oil Co.'s No. 1 State Land, NW cor. SE Section 22-34-43w, Morton County, is estimated to have 7,500,000 feet of gas at 2,500 feet. This well extends the gas production 20 miles to the west, within 3 miles of the Colorado state line. The Hugoton gas field now extends in area an estimated 50 miles north and south and 60 miles east and west. The Hydraulic company's well is an important extension to the west.

The active area now extends to the surrounding counties in the southwestern part of Kansas and Texas County in the Oklahoma Panhandle. All the production in the area is gas. Some express the opinion the area may produce oil from deeper strata. Two deep tests are now drilling, one by the Argus Production Co. and the other by W. M. McKnab, an independent operator.

Since the pipe lines have been designed and are under construction to carry the gas to outside markets the gas area has been undergoing an active drilling campaign, which has resulted in the drilling of more than 90 tests and building the potential of the field to an estimated 350,000,000 feet of gas.

Areas to Be Tested

The adjoining counties have been leased and several wildcat tests are being drilled to test these areas. The Argus Production Co. is pushing its leasing activities to the northeast and recently has taken acreage in the northeastern part of Stevens County. Southwestern Kansas and the Oklahoma Panhandle are undergoing an intensive research. Almost every form of geological equipment is being used, including the torsion balance, seismograph, magnetometer and core drill. The Argus Production Co. is drilling in Stanton County, E. W. McKenna and others are drilling in Grant County and the Liberal Gas Co. has a rig built in Seward County, in Section 4-35-34w.

In the Patterson Pool, north of Hamilton in Greenwood County, drilling remains to be completed. The Empire Oil & Refining Co., Prairie Oil & Gas Co. and A. M. Landon have the major part of the undeveloped acreage. Tulsa Oil Co. opened a new area south of the production in the Patterson area, in the lime, which may lead to further drilling. In the Lamont Pool, operations have slowed down until the oil business has improved.

Since the Phillips Petroleum Co. and Aladdin Petroleum Co.'s No. 1 Spain was abandoned, southwest of the Wiggins Pool, in Greenwood County, the same companies are preparing to start No. 5 Jones in Section 36-24-10. The test has been delayed waiting for the completion of other wells in the area. The development has slowed up since the completion of other tests.

Barber County

Barbara Oil Co.'s No. 2 Angel, C NW NE, Section 23-33-13w, has been completed for 1,000,000 feet of gas in sand 4,456-66 feet.

Butler County

Empire Oil & Refining Co. has built the rig for No. 21 Houston, NW cor. SW SW, Section 19-26-5. The rig is up for No. 103 Koogler, NE cor. SW, Section 20-26-5. Sullivan and others' No. 1 Newcomb, NW cor. SE, Section 6-27-4, is dry and abandoned at 3,038 feet.

Cowley County

Roth & Faurot made location for No. 3 Holt, NE cor. NW SE, Section 12-32-4. Minnehoma Oil Co.'s No. 1 Denton, SE cor., Section 4-31-8, has been abandoned at 2,030 feet. The Prairie Oil & Gas Co.'s No. 2 Zeien, NW cor., Section 19-32-5, made 42 bbls. in sand 3,097-3,128 feet.

Elk County

Flemming and others' No. 1 Morgan, SE cor., Section 8-29-9, made 200 bbls. in Viola lime 2,646-50 feet.

Coffey County

The Prairie Oil & Gas Co.'s No. 1 Hatch, NW cor. SE, Section 35-21-13, has been completed for 80 bbls. in Burgess sand topped at 1,812 feet, total depth 1,823 feet.

Greenwood County

Aladdin Oil Co. and Phillips Petroleum Co.'s No. 2 Harris, SW cor. NE SW, Section 19-22-11, has been completed for 75 bbls. in sand 2,043-67 feet. Harwood Oil Co.'s No. 1 Loy, SW cor. NE, Section 20-25-10, is dry and abandoned at 2,142 feet.

McPherson County

A. F. Perry and others made location for No. 1 Unruh, SE cor. NE SE, Section 27-20-2w.

Reno County

United Petroleum Co. and others' No. 1 Houston, NW cor., Section 4-22-10w, has been abandoned at 3,544 feet. Palmer

(Continued on Page 344)

WILDCAT OPERATIONS IN KANSAS

(Descriptions are East unless marked otherwise)

Company, farm and location—	Remarks:
BARBER COUNTY	
Barbara Oil Co.'s No. 1 Hamblin, SW NW Sec. 24-33-13w	Fishing 4,487-4,508 ft.; 20,000,000 ft. gas; drlg. out plug 4,450 ft.
Phillips Pet. Co.'s No. 1 Powell, SE cor. SE Sec. 11-33-10w	Shut down 4,868 ft.
BARTON COUNTY	
Skelton Oil Co.'s No. 1 Ott, C SE SE Sec. 16-19-14w	Rig.
McCool et al's No. 1 Tsern, SW SE NE Sec. 12-20-11w	Drlg. 1,500 ft.
BUTLER COUNTY	
National Ref. Co.'s No. 1 Settergren, NW cor. Sec. 32-26-4	Drlg. 1,880 ft.
McCulloch and Empire's No. 1 Lilley, SW NW NW Sec. 23-23-5	Drlg. 350 ft.
Farrell et al's No. 1 Sutton, NW cor. Sec. 18-28-7	Shut down 830 ft.
Gypsy Oil Co.'s No. 1 Osborne, NW SE Sec. 22-26-3	Drlg. 3,035 ft.
CHAUTAUQUA COUNTY	
Leighty et al's No. 1 Carr, NW SE Sec. 5-33-9	Drlg. 1,200 ft.
CLARK COUNTY	
Watchorn's No. 2 Morrison, NW NE Sec. 20-32-21w	Drlg. 6,800 ft.; show oil and gas.
CLAY COUNTY	
Crystal Oil et al's No. 1 Tivier, SW cor. Sec. 19-8-2	Shut down 1,810 ft.
COFFEY COUNTY	
Heyburg's No. 1 Kroft, SE SW SE Sec. 30-22-14	Drlg. 310 ft.
Prairie Oil & Gas Co.'s No. 1 Hatch, SE cor. Sec. 35-21-13	Drlg. 1,805 ft.
McGregor's No. 1 Wood, NE NW SW Sec. 20-22-16	Drlg. 650 ft.
Roberts et al's No. 1 Hay, SW SE NW Sec. 32-22-15	Drlg. 1,125 ft.
COWLEY COUNTY	
Roth & Farout's No. 1 Reedy, SW NW NE Sec. 8-32-8	Drlg. 375 ft.
Tom Fine's No. 1 Boyd, NW NE Sec. 32-32-4	Shut down 2,650 ft.
DOUGLAS COUNTY	
Steinbuckle's No. 1 Unknown, SW NE NW Sec. 34-14-21	Shut down 1,100 ft.

(Continued on Page 370)

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Arkansas Sees Deep Drilling Activity

Two Wells Started and Third Projected Taken to Indicate Campaign for Deep Production in Smackover and El Dorado Region

By D. H. Bancroft
Staff Correspondent, Louisiana-Arkansas

SHREVEPORT, La., Sept. 29.—With two deep wells under way and a third considered certain it seems that El Dorado and Smackover territory may have a deep drilling campaign. In addition to the 4,000-5,000-foot well southwest of Urbana started by Modisette and others, J. E. Crosbie and associates have set surface string on a well contracted to go 4,500 feet and J. D. Reynolds and associates are reported progressing with plans for another deep hole. The Crosbie well is on the G. L. Murphy land in the SW SW, Section 13-16-16, in Union County, just south of Smackover production. Because of the history of other wells in the vicinity in the shallow and deep Smackover sands this well will be of interest to the industry in this division in general. Several El Dorado operators are directly interested in it with Crosbie who, a few years ago drilled two or three wells on the east edge of the field below the known Smackover pays.

Mississippi was prominent in the news again this week with four completions in the Jackson gas district which brought the field's total open flow capacity close to 500,000,000 feet per day. One of the four is 2 miles east and the same distance north from the two nearest producers.

Disappointment Increased

Disappointment caused by appearance of salt water in large quantities in H. I. Morgan and others' No. 2 Kendrick, Section 22-19-11, Bellevue district, Bossier Parish, following its completion a few weeks ago was increased by abandonment of No. 3 Kendrick 400 feet west of No. 2. Total depth was 1,964 feet. However work was begun immediately on No. 9-B Kendrick a quarter mile north and in the same section. Also Louisiana Oil Refining Corp. is rigging up on No. 13-B Bodcaw in the SE SW, Section 11-19-11 for a deep test 1,800-1,900-foot well within Bellevue proven territory.

In the Carterville district of Bossier The Texas Company completed No. 2 Rose, SW NE, Section 31-23-11, pumping 20 bbls. from 3,176 feet and cored 4 feet of sand showing oil in No. 1 Pine Woods Lumber Co., Section 25-23-12, which was saved from cratering. Total depth is 2,686 feet.

Texas-Louisiana Producing Co., under which listing Louisiana Gas & Fuel Co. is drilling a second well for the 5,500-foot gas horizon found by R. W. Norton's wildcat No. 1 Hill in Section 33-23-16, Caddo Parish, has rig up for the third, No. 1 French in the SW NW, Section 34-23-16. No. 1 Wall is in the same section with the discovery well. J. W. Burton's No. 3 Burton, Section 7-20-15, Pine Island district, pumped 20 bbls. initial from 1,585 feet. The Bienville Parish prospect at Gibsland is not showing up so encouragingly since setting 6⅝-inch to test the show it had before Triangle Drilling Co. and Ruston Drilling Co. took it over from Nichols and others. The well, No. 1 McDermott, in Section 28-18-6, had 10 feet of oil on drill stem test, but since setting the pipe it has tested dry at 2,262 feet and again at 2,270 feet.

Gets 3,000,000-foot Gas Well

A. C. Glassell's No. 1 Pittsfield Plantation in Section 41-8-10, Concordia, a rank wildcat, has been formally listed as a 3,000,000-foot gas well at 1,491 feet, total depth. Rock pressure was 610 pounds, but as there was plenty of water with the gas this phase of the gauge is not accepted as accurate. Glassell's No. 1 Pecania Plantation in Section 46-8-9 is still a location, but Joe Marr and associates have resumed drilling No. 1 Maxwell in Section 35-3n-8 which was shut down early in July and were making hole at 2,845 feet when scouted just after starting up again. Hudson and others' No. 1 Burton in Section 35-12-2e, Caldwell Parish, about half way between Urania oil and Richland gas, concerning which there was a flutter of interest on account of an oil show in the top of the Jackson at around 700 feet, is shut down in a salt water sand at 1,672 feet.

Triangle Drilling Co. has rigged up on two new tests in the Sugar Creek Trinity gas area while negotiating with Louisiana Gas & Fuel Co. and other interested parties, for a gasoline plant and contracts for stripped gas. Both are in the discovery section, No. 1 Brownfield in the NW NE, Section 6-19-5, and No. 1 J. W. Stevenson in the SW SE. No. 1 Hodges in the NW cor. NW SE of the same section, completed last week with an estimated 35,000,000 feet of gas at 1,875 pounds from 4,310 feet gauged closer to 50,000,000 feet.

Production

Daily average production of the various pools in this area during the past week follows:

NORTH LOUISIANA

	Bbls.
Caddo, lights	8,805
Caddo, heavy	2,720
Homer	3,440
Haynesville	4,900
DeSoto-Red River	2,975
Elm Grove	545
Bellevue	660
Cotton Valley	1,850
Urania	5,270
Pleasant Hill	510
Sarepta-Carterville	2,625
Zwolle	4,695
Holly	1,075
Total this week	40,070
Total last week	40,500
Decrease	430

ARKANSAS

El Dorado	4,065
Smackover, light	5,040
Smackover, heavy	36,790
Stephens	910
Nevada County	1,010
Lisbon	900
Champagnolle	3,740
Bradley	65
Mount Holly	85
Urbana	1,000
Total this week	53,605
Total last week	53,645
Decrease	40
Both states	93,675
Last week	94,145
Decrease	470

No 1 Dry Is Just That

Gulf Refining Co.'s No. 1 Dry, Section 14-11-15, approximately 15 miles southwest of Mansfield, DeSota Parish, was just that; abandoned at 3,584 feet.

Pelham & Bundy appear to have a small producer in No. 1 Rhodes, Section 32-13-14, near Grand Cane and about 8 miles northwest of Mansfield and the same distance southwest of Holly production. How good it will be, or whether it will develop as a producer remains to be seen. It pumped 35 bbls. of clean oil per hour for the first two hours it was on the beam, but after that started making fresh water and later salt water. Later unverified reports were that the water had disappeared and it was again pumping clean oil. Total depth is 3,009 feet with sand from 2985-90 feet. Six miles north of it S. A. Guy, one of the pioneers in the north Louisiana fields who has been in Texas for the last several years but recently returned to Shreveport, has begun drilling No. 1 Dowling Brothers in the NE NE, Section 31-14-14. Standard Oil Co.'s No. 2 Dowling Brothers in the SW NE, Section 5-13-13, Holly district of DeSoto, pumped 116 bbls. from 2,884 feet, as the rather disappointing pool's sixth producer. J. W. Cooper and associates' No. 1 Cooper, Section 35-11-10, Natchitoches Parish, another rank wildcat, is showing a little gas at 1,290 feet and has set drill stem with packer at 1,280 feet and is trying to bail in. Meanwhile they have begun work on No. 1 Louisiana Delta Pecan Co. in the SE SE, Section 32-11-10.

One Monroe Completion

Jordan Drilling Co.'s No. 1 J. B. Parker, Section 41-18-4, Ouachita Parish, was the Monroe gas district's sole representative in the completions' report but Richland had three wells making approximately 80,000,000 feet open flow. Hope Producing Co.'s No. 1 J. E. Duff, NW SE, Section 15-16-6, gauged 4,680,000 feet at 490 pounds, total depth 2,450 feet, and Northern Louisiana Natural Gas Co.'s No. 5-B McCoy, SE NE, Section 17-16-6, made 38,876,000 feet at 465 pounds from the same depth. The rock on these two wells reveals the effect the Thompson crater is having on the producing sand in its vicinity.

Louisiana Gas & Fuel Co.'s No. 1 Etheridge, SW NE, Section 28-17-6,

(Continued on Page 343)

LOUISIANA-ARKANSAS PROVEN AREAS

NORTH LOUISIANA

BOSSIER PARISH—BELLEVUE

Company, farm and location—	Remarks—
H. I. Morgan's No. 9-B Kendrick, 1,120 ft. N, 1,520 ft. E, SW cor. NW, Sec. 22-19-11	Rig up.

BOSSIER PARISH—CARTERVILLE

Del.-La. Dev. Co.'s No. 6 Bollinger, 330 ft. S, 220 ft. W, NW cor., Lot 17, in Lot 16, Sec. 31-23-11	Hole full oil; W.O.S.R; 15 ft broken sand; T.D. 3,217 ft.
Greenwood Prod. Co.'s No. 2 Bollinger, 990 ft. W, 330 ft. S, NE cor. NE SE, Sec. 36-23-12	Cmtd. 6⅝-in. 3,128 ft; 5-ft. sand; W.O.S.R. 3,172 ft.
Palmer Corp.'s No. 2 Roberson, 330 ft. N, 330 ft. E, SW cor. NW NE, Sec. 26-23-12	Derrick.
The Texas Co.'s No. 1 Pine Woods Lbr. Co., 1,650 ft. S, 300 ft. E, NW cor., Sec. 25-23-12	Cored 4-ft. sand showing oil 2,636 ft.
The Texas Co.'s No. 14 Wilkinson, 990 ft. N, 990 ft. W, SE cor. SE NW, Sec. 36-23-12	Drlg. red beds and gummy shale 3,890 ft.
The Texas Co.'s No. 16 Wilkinson, 330 ft. N, 330 ft. E, SW NE, Sec. 36-23-12	Derrick.
Tippett Drlg. Co.'s No. 3 Holmes, 330 ft. N, 330 ft. E, SW cor. NE NW, Sec. 36-23-12	300 ft. oil in hole; waiting on power; T.D. 3,180 ft.

BOSSIER PARISH—ELM GROVE

R. O. Roy's No. 1 Hunter, 660 ft. N, 660 ft. E, SW cor., Sec. 24-16-11	Began drlg. Sept. 21; drlg. 100 ft.
Woodley Pet. Co.'s No. 1 Harris, 247 ft. E, 660 ft. S, NW cor. NE NE, Sec. 14-17-12	Began drlg. Sept. 18; cmtd. 10-in. 129 ft; drlg. 1,250 ft.

BOSSIER PARISH—SLIGO

La. G. & F. Co.'s No. 1 Webb, 4,650 ft. W, 660 ft. S, NE cor., Sec. 24-17-12	Began drlg. Sept. 23; cmtd. 12½-in. 282 ft.

CADDO PARISH—GREENWOOD

Calatex O. & G. Co.'s No. 1 Edgar, 1,460 ft. S, 1,900 ft. E, NW cor., Sec. 17-16-16	Location.
Calatex O. & G. Co.'s No. 1 McAnn-Alfred, 1,810 ft. S, 970 ft. E, NW cor., Sec. 17-16-16	Location.
Calatex O. & G. Co.'s No. 1 Hudson, 2,395 ft. N, 660 ft. E, SW cor., Sec. 8-16-16	Drlg. 2,980 ft.

(Continued on Page 373)

WILDCAT OPERATIONS IN LOUISIANA-ARKANSAS

NORTH LOUISIANA

AVOYELLES PARISH

Company, farm and location—	Remarks—
Gas-Con Oil Corp.'s No. 1 Morrow (no check), Sec. 14-2s-4e	Drlg. gumbo 1,830 ft.
R. E. Tippett's No. 1 Chateline, NE NE, Sec. 34-1n-3e	Cored S.W. sand 3,140-47 ft; drlg. S.W. sand 3,400 ft; S.D. 3,410 ft.

BIENVILLE PARISH

Carter & Dobbs' No. 1 White, 330 ft. N, 330 ft. W, SE cor. SE SE, Sec. 9-18-6	S.D. 1,100 ft.
W. A. Nichols et al's No. 1 McDermott, 660 ft. S, 660 ft. W, NE cor. NE NE, Sec. 28-18-6	Cmtd. 6⅝-in. 2,195 ft; D.S. test 2,262 ft. dry; bailing 2,270 ft; corrected depth.
S. P. Borden's No. 1 Thomas, 330 ft. S, 330 ft. E, NW cor., Sec. 27-16-9	Cored lime and shale 3,300 ft.
Olds & Smith's No. 1 Brice, 330 ft. N, 330 ft. E, SW cor. SE SE, Sec. 15-18-6	S.D. 1,500 ft.

BOSSIER PARISH

Andrews & Davlin's No. 1 Nattin, 100 ft. N, 250 ft. W, C, Sec. 15-22-14	Fishing bailer; T.D. 1,501 ft.
Autrey Oil Co.'s No. 1 Johnson, 1,120 ft. N, 200 ft. E, SW cor. NW, Sec. 34-19-11	Began drlg. July 25; S.D. for fuel 60 ft.
Autrey Oil Co.'s No. 1 McDade, 200 ft. S, 200 ft. E, C, Sec. 28-19-11	D.S. test 2-ft. sand 2,010-12 ft; dry; S.D. 2,335 ft.

CADDO PARISH

L. B. Mawk's No. 1 Swann, 440 ft. N, 200 ft. E, SW cor., Sec. 23-21-14	S.D. for fuel; T.D. 700 ft.
Tex.-La. Prod. Co.'s No. 1 French, 1,270 ft. N, 675 ft. E, SW cor. NW, Sec. 34-23-16	Rig up.
Tex.-La. Prod. Co.'s No. 1 Wall, 2,715 ft. N, 1,980 ft. W, SE cor., Sec. 33-23-16	Rig up.

CALDWELL PARISH

Hudson et al's No. 1 Burton, Sec. 35-12-2e	S.D. 1,672 ft; S.W. sand.

CATAHOULA PARISH

La. G. & F. Co.'s No. 1 Tensas Delta Land Co., 660 ft. N, 1,318 ft. E, SW cor., Sec. 23-6-5	Drlg. lime 2,522 ft.

CLAIBORNE PARISH

Baird Bros. et al's No. 1 Whittaker, 600 ft. N, 400 ft. W, SE cor. NE, Sec. 30-20-7	S.D. 2,100 ft.

(Continued on Page 335)

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Interest Is High in Southwest Texas

Magnolia Well in Duval County, Batex Well in Bee County and Independent Well in Nueces County Centers of Attention

By B. D. Stevenson
Staff Correspondent, Southwest Texas Fields

SAN ANTONIO, Tex., Sept. 29.—Rarely has a week closed lately in Southwest Texas without some operator running into something new with the result that interest is kept high. Magnolia Petroleum Co. Friday at 2,380 feet in its No. 1 Edge Hall, in the northwest corner of Survey 63, Duval County, 150 feet from the north and west lines of the survey and 2½ miles northeast of the Schoolfield-O'Byrne Pool, cored a sand that caused suspension for a drill stem test which was expected to be made within a few days. The location is up the Reynosa escarpment that comes up through the Mirando district and angles off to the northwest through Duval County, along which many pools are located. The new pool opened by Vacuum Oil Co. and S.R.C. Oil Co. in northwestern Duval County is approximately 8 miles northwest of the Magnolia test.

Trend of pools in that part of the Laredo district is from southwest to northeast and the new Magnolia test is approximately in line between the Schoolfield-O'Byrne Pool on the southwest and the area to the northeast where W. H. Gee has drilled two wells that indicate a faulted condition and may lead to the opening of a pool.

Border Area—Bee County

One other new find is that of the Batex' No. 2 Burnett in the Cosden area in the Pettus district. It has been standing at about 3,660 feet, the approximate depth of production in the Cosden Pool, for some time and was reported as a completion. Production in the discovery district and in the southern part of the Pettus Townsite is around 3,900 feet. Batex deepened and found another sand showing oil in the Cosden area at 3,805-50 feet with some streaks of shale and is continuing to deepen. It will probably go as deep as the production in the field to the east.

It is important from more than one angle. Some have suspected that the sands in the Pettus are are lenticular. If the producing sand of the discovery well is found in the Cosden area and is productive there also, it will give a proven length east and west of about 3 miles and a width north and south of about half a mile. The Batex well, therefore, may add a great deal of information to the Bee County area.

Nueces County

A third new development for the week was the Independent's No. 1 Baldwin in Nueces County on the southeast edge of the Saxet Field. It was expected at the close of the week before when the test passed the contract depth at 5,000 feet that it might be abandoned but early last week orders came to deepen and at 5,216 feet it cored a sand that indicated possibilities of production. Total depth is 5,226 feet and last reports it was reaming down preparatory to making a drill stem test.

Duval Wildcat

Vacuum Oil Co.-S.R.C. Oil Co.'s No. 1 Duval Land Co., in northwestern Duval County on Survey 293, 5 miles from the north and west lines of the county, did better than many expected when the first 12 hours on the pump it made 165 bbls. It heads every 10 hours. Total depth is 1,722 feet. This well ran into the oil sand a few weeks ago but was not finally tested till the past week and the first gauge on the pump was Friday. It is 8 miles northwest of the Schoolfield-O'Byrne Pool and in pure wildcat territory and no other test was ever drilled near it. It is on a block of 75,000 acres owned by the Vacuum Oil Co. and the S.R.C. Oil Co., in which the Tom Slick estate is interested as a half owner of the well which perpetuates one-third of the lease block of 75,000 acres.

The well is located near the center of the east half of Survey 293. The oil is a little above 19 gravity and there is practically no water coming with the oil. The gravity of the oil is about the same as most of the Mirando crude. No new locations have been announced as yet around the well. The location has not been surveyed as to the survey lines but was made with reference to the geology.

Two additional wells are to be drilled on the 75,000-acre block by Vacuum and S.R.C. One has moved onto location and is drilling a water well according to latest reports. It is located approximately 4 miles southwest of the first test and was rigging up as the first was being completed.

Quinch Ranch Test

Left over from the week before is the Quinch Ranch test in Bee County 12 miles east of Beeville and 25 miles from any production. It has been reported as having blown in while coming out with a core. Later, on a drill stem test, it proved it would make a big gas well. Casing has been set and liner also and as the week closed it was waiting for a shipment of screen with the probability it would be some time this week before it is completed and brought in. Its total depth is 4,947 feet.

Other Interesting Tests

E. L. Chapman in northern Bastrop County a mile west of Elgin at 1,935 feet has a showing of oil after encountering a crevice and it may develop something interesting.

Miller & Calhoun in northern Guadalupe County near Staples were in the Edwards lime late last week and bailing the fluid down but with no definite results announced yet.

Carl Brothers, a little east of San Antonio, got sulphur water in the Edwards and will abandon.

A new wildcat is announced in Kendall County to be drilled by Abercrombie Oil Co. and Harrison Oil Co., both of Houston.

Grayburg Oil Co.'s No. 1 Kimball, the discovery well in Bee County in the pool 7 miles southwest of the Pettus Pool, is a completion and making about 25 per cent oil to 75 per cent water but at last reports the water was decreasing and gas increasing. This well came in months ago, but mechanical trouble developed and the company has been put to much expense and labor to get it completed. First reports placed the oil at about 35 bbls. At any rate it is an oil well and later developments may show a producing pool after all the misfortune it has had.

National Oil Co.'s (C. J. Webster) No. 1 Howard, in Medina County, a wildcat that showed a lot of oil, has been tested and is rated as a commercial well at 1,645 feet, and it is several miles from any oil production.

Southwest Texas Production

Daily average production of the pools in the Southwest Texas area for the week ending September 27 follows:

Branyon	23
Bruner	15,923
Buchanan	166
Chapman	11,671
Dale	683
Darst Creek	49,828
Kingsville	123
Larremore	30
Luling	9,885
Lytton Springs	764
Manford	304
McMullen	35
Medina	22
Mirando	13,545
Pettus	7,663
Saxet	33
Somerset	1,506
Yoast	320
Total	112,524
Week ending September 20	107,941
Increase	4,583

Pettus Area

There were no completions in the proven district in the Pettus area the past week but the Union Producing Co.'s No. 21 Ray, adjoining the townsite, topped the pay at 3,868 feet and cored to 3,871 feet and set casing. No. 18 Ray is waiting on cement after setting casing with total depth of 3,912 feet, and C.R.M. Co. on Block 22 of the townsite has drilled plugs and set screen and is ready to complete at a total depth of 3,908 feet. So there will be some completions this week.

Outside of the Quincy Ranch test east of Beeville which the industry is waiting to see brought in a test of interest in wildcat area in Bee County is the S.R.C. Oil Co.'s No. 1 Theis west of Beeville and southwest of the Simms' No. 1 Holzmark. No. 1 Theis at last depth reported was down to 4,560 feet and drilling with nothing of importance to report in the way of showings thus far.

Guadalupe County

Darst Creek completions for the week added a total of 9,078 bbls. initial production to the field. Gulf Production Co. got the best break with three wells making a total of 3,643 bbls., the wells being Nos. 4 and 5 Thomas Dix and No. 6 Posey-Baker. The Texas Company's No. 6 Henry Willie and No. 6 W. R. Posey combined added 2,340 bbls., and Humble's No. 16-A Denman, 800 bbls.; Louisiana Oil Refining Co.'s Nos. 6 and 7 Thomas Dix, 1,090 bbls.; Sun Oil Co.'s Nos. 9, 10 and 11 Knoblock, 1,205 bbls.

In the Guadalupe County area among the wildcats the Grayburg's No. 2 Wells had a little bad luck in the way of a fishing job and is sidetracking.

South of Seguin, Cranfill & Reynolds' No. 1 Meyers topped the chalk at 2,000 feet, but most oil men seem to be figuring it out as running too close to normal as to structure to offer much. This country south of Seguin has seemingly enough geology to keep operators interested in it. It is wildcat territory and there are probably 25 dry holes within a radius of a few miles but the logs of these dry holes seem to indicate structure to someone. Wells have been drilled on as little as 50 acres in this purely wildcat territory. The operators were probably aided with dry hole money by owners of leases around but at that it is unusual. In one case a well was drilled on much less than 50 acres and gave a one-thirty-second overriding royalty. The report is out that even if the No. 1 Meyers should be dry another operator will drill a test. Wildcats in that territory have not been without their showings of oil and gas as evidence of accumulations of oil in the country somewhere. The belt covers a territory in width that would take in any production on an extension of either the old Luling or the new Darst Creek fault lines.

Laredo District

There were only four producers completed in the Laredo district last week, three of them in the Escobas-Muckelroy Pool adding a total of 215 bbls. initial production and one in the Humble's Kohler Pool, the No. 49 Kohler, adding 15 bbls. Two new locations were made in the Escobas-Muckelroy Pool and one in the Killam-Cuellar Pool. It was the lightest week in that respect that the Laredo district has had in some time. It may be the effect of conservation and state-wide proration and the promise of operators to hold things down.

Of the various spots of interest, the Brooks County proposition around the Lasater well has been standing nearly still. Humble is down 5,085 feet in its No. 2 Singer in which the Shell is interested and standing. Houston Oil Co.'s No. 2 Holbien-Wormser is drilling at 4,004 feet. The No. 1 Lasater, discovery well, got its production at 4,112 feet.

Southern Crude Oil Purchasing Co.'s, No. 1 Holbien-Wormser is drilling at 3,550 feet. The Southern Crude Oil Pur-

(Continued on Page 340)

WILDCAT OPERATIONS IN SOUTHWEST TEXAS

ATASCOSA COUNTY

Company, farm and location—	Remarks:
Frontier Oil Co.'s No. 2 Boynton, 775 ft. SW of Brown-Fuller gas well	T. D. 2,175 ft.; showing gas.
Nute, Walder & Derden's No. 1 J. B. Young, 750 ft. W line, 370 ft. E line of 107-ac. tract in the Wm. Moore Sur.	Location.

BLANCO COUNTY

Anderson & Manning's No. 1 Speer, 600 ft. to S line, 800 ft. to W line, John W. Speer Sur.	Moving in rig.
Ben H. Ashe Pet. Corp.'s No. 1 Glasscock, moving in to drill on leases out of the Rodson block north of Blanco City	Location.
Hardy-Sitton's No. 1 McMillan	T. D. 260 ft.; shut down.
Liles-Adams et al's No. 1 Stanford, 150 ft. to S line, 1,420 ft. to E line of James Stanford's No. 155	T. D. 532 ft.; resetting casing.
McCleary et al's No. 1 Schenling, 900 ft. to SE line, 600 ft. to S line of J. A. Rouse No. 118 Sur., 4 miles SW from Blanco City	T. D. 660 ft.; shut down.
J. R. Meek's No. 1 Walker, 360 rds. from W line, 482 rds. from S line of 375-ac. tract in Sur. No. 23	T. D. 875 ft.; drlg. lime.
C. Rosenfield's No. 1 Hohenberger, 800 ft. to W line, 1,250 ft. to N line, Sur. No. 94	T. D. 340 ft.; moving in heavy rig.

BASTROP COUNTY

Pacific Oil & Gas Co.'s No. 1 J. M. Litton, 150 ft. N and W lines of tract	Moving in.
Majestic Pet. Co.'s No. 1 J. M. Breeding, 160 ft. from N line, 1,020 ft. from W line of 200-ac. tract, 940 varas from W line, 1,225 varas from S line of M. Andrews Sur., 13 miles W from Smithville	T. D. 76 ft. (corrected); shut down.
Champion et al's No. 1 Smith, 2,541 ft. to NW line, 663 ft. to SW line of tract, E. Standifer Sur.	T. D. 2,065 ft.; setting casing.
Texas Pet. Products Co.'s No. 1 Trigg, Stewart Sur.	Location.
R. S. Bolling's No. 1 McWilliams, 150 ft. from N line, 1,111 ft. from W line of Wm. McWilliams tract, Glasscock Sur.	Rigging up.

BROOKS COUNTY

Humble Oil & Ref. Co.-Shell Pet. Corp.'s No. 1 Wm. Singers, 1,320 ft. W of E line, 1,500 ft. S of N line of Sec. 312, Alta Verde area, 7 miles SE from Lasater gas field	T. D. 5,110 ft.; drlg. shale.

(Continued on Page 423)

Mykawa May Have Commercial Well

On Torsion Balance Prospect Just Southeast of Houston. Estimated From 300 to 500 Bbls. Good Barbers Hill Well

By Nell Williams
Staff Correspondent, Gulf Coast Fields

HOUSTON, Tex., Sept. 29.—What appears to be the first commercial oil producer at Mykawa, a torsion balance dome prospect just a few miles southeast of Houston, was brought in Saturday as one of the principal developments in Gulf Coast Field operations of the week. The well is Humble Oil & Refining Co.'s No. 3 Minnetex, Block 252, of the Minnetex Subdivision of the William Lovett Survey, and is estimated good for from 300 to 500 bbls. daily.

The new well was swabbed in from a sand at 4,826-73 feet and flowed approximately 140 bbls. in the first six hours under chokes and through tubing. Screen had been set in the sand, being run in on the bottom of the string of 9⅝-inch casing when it was set and cemented.

No. 3 Minnetex is the eighth test drilled at Mykawa, which was discovered during 1928. The torsion balance indicated a possible salt dome or a "Miocene high." Tests have encountered numerous favorable showings and heavy gas pressures, but efforts to complete a successful producer have failed until possibly now. Two of these tests, Humble's No. 2 Irvin and No. 1 Siadous, have produced some oil but not in commercial quantity. The former originally was completed as a 50,000,000-foot gas well from a sand at 4,189 feet. This gas, which was turned into the line of the Houston Pipe Line Co., supplying some of the Houston gas lines for a time, later began spraying some oil, which was trapped in a drip placed on the line. As much as 20 bbls. of oil daily was accumulated at times. Early this year No. 1 Siadous was completed as an oil well from sand at total depth of 4,933 feet. This well flowed 34 bbls. in the first 12 hours with estimated 4,300,000 feet of gas and then was shut in. Later it flowed at the rate of 100 bbls. daily for a time but failed to hold up and then was deepened to 5,900 feet and abandoned.

Progress of Curtailment

Other developments on the Gulf Coast during the week were somewhat limited due to the general drilling and development curtailment program. The slowing up of operations in the past several weeks is beginning to be reflected in the daily production column, which has been indicating a steady decline. The 30-day period of grace granted the Gulf Coast district from statewide proration program expired September 27. Although in that time, coastal operators have not brought their production down to the scheduled amount, the slowing up of new work is due to accomplish the purpose gradually. With the gradual completion of operations which have been under way and the confining of new work in the immediate future to outside wells and necessary locations, Gulf Coast production from now on should indicate a decided drop.

Daily average production for the entire Gulf Coast district, including southern Louisiana, decreased only 2,009 bbls., but in the Texas coastal fields alone there was a decline of 5,281 bbls. The addition of a substantial amount of new production in the new pool north of Vinton accounted for an increase in the Louisiana coastal figures which offset a large part of the decrease felt in the Texas coastal fields.

Barbers Hill Completion

Among the more important completions of the week was Mills Bennett Production Co.'s No. 1 Henry Fisher on the southwest flank of the Barbers Hill Dome. This well, the third in that new area, opened earlier this year by Yount Lee Oil Co.'s No. 1 Zadie Fisher and the same company's No. 2 Zadie Fisher, was brought in flowing 1,050 bbls. daily. Bottom of the hole is 6,500 feet and two joints of 4½-inch screen were set. This well extends the production nearly 500 feet northward.

Although a number of other deep wells at Barbers Hill are at interesting depths and promise extensions and additions to production, only one other well was completed there during the week. That was Sun Oil Co.'s No. 9 Wilburn fee on the southeastern flank. No significance was attached to it as it was an inside well. With 162 feet of screen at 5,167 feet it flowed 400 bbls. daily initially.

On the southwest side of Pierce Junction, Saxet Oil Co. made a well in its No. 8 Herman estate flowing 1,000 bbls. of fluid, 30 per cent oil, from sand and shale at 4,594 feet. Eighty-six feet of screen was set. Rio Bravo Oil Co.'s No. 20-A Settegast, further north on the west flank, tested salt water at 4,854 feet. The latter is 300 feet west of No. 19, which was completed last month flowing between 5,000 and 6,000 bbls. daily.

New Area at Humble

At Humble, where a new productive area on the west flank is being developed, there were no important developments. Rio Bravo Oil Co. got a small well in its No. 7 fee on the southernmost end of the west flank production. With most of the offset requirements taken care of in this development it is likely there will be a decided letup in work there as present operations are completed.

Refugio's Decline

Refugio was in the spotlight during the week with two wild gas wells but late in the week both had been put under control and probably will be completed successfully. These are Saxet Oil Co.'s No. 3 Ryals and Luling Oil & Gas Co.'s No. 1 West. The former on the extreme east edge of field ran wild for a week after blowing out at 5,671 feet. The west well, Block 81 of the townsite was killed after being out of control less than a day. The latter is in the deep sand at 6,458 feet.

Interest in Refugio otherwise has subsided very materially in the past several months. Although there has been a steady extension of the producing area from the 6,400-6,500-foot sand, it generally is felt that the field is over. The deep development has resulted mostly in small wells, although with large gas volume, and the new production is not sufficient to check the gradual decline in the field's output. Probably until all the townsite locations are drilled there will be a continuation of the drilling activity but otherwise there has been a steady letup in work as operations have been completed.

Other completions reported during the week were Rio Bravo Oil Co.'s No. 91-A Cotton, Saratoga, which is flowing 100 bbls. of pipe line oil daily from sand at 509 feet; Yount Lee Oil Co.'s No. 141 McFaddin, Spindletop, 225 bbls. pipe line oil daily from 3,754 feet, and Union Sulphur Co.'s No. 734 fee, Sulphur, a former producer deepened to 5,498 feet, flowing 900 bbls. The Saratoga well is one of a series which has been completed in the 500-foot sand, development of which has been under way only the past few months. The 500-foot wells are a part of a repressuring program which the company has in operation. This is the second flowing well although the previous wells have made good pumpers and clean Grade A oil.

At Danbury, Shell Petroleum Corp. abandoned its No. 1 Haury, the fifth test drilled on that dome. This is one of a series of tests being drilled in an effort to prove up a shallow sand which has showed oil in nearly all the tests drilled. The test was abandoned in shale at 1,604 feet.

Deep Drilling at Hackberry

A deep drilling record was established at Hackberry, Cameron Parish, Louisiana, by Federal Petroleum Co., which went to 7,834 feet in its No. 1 Hebert, Section 33-12s-10w. An attempt to sidetrack stuck drill stem failed and the hole was junked.

At High Island, Galveston County, Marrs McLean abandoned No. 18 Cade in shale at 4,177 feet. Among other abandonments was Morris and associates' No. 1 Chapman, a wildcat in the Donoho Survey, Waller County, north of Hempstead, and C. S. Thomas' No. 1 Taylor, a shallow test at Boling.

East of Stratton Ridge, Brazoria County, Rycade Oil Corp. is rigging up for its second test, No. 2 Seaburn, located in the Austin and Williams Survey, 85° east, 2,174 feet from No. 1, which was abandoned in salt at 2,750 feet. Finding of salt at that depth has given rise to some speculation of the possibility of the existence of two domes at Stratton Ridge or an extreme irregularity in the old dome. Rycade's test was drilled as a wildcat on the east flank of the dome, some 2,000 feet from previous development on top the dome. However, between it and the old dome, several tests below 4,000 feet have been drilled without finding salt.

Louisiana Gas & Fuel Co., now a subsidiary of the United Gas Co. of Houston, is starting up development on its block of some 12,000 acres at Houma, Terrebonne Parish. The block was obtained during 1929 and includes the holdings of the former Terrebonne Gas Co., which drilled a number of tests, several of which were completed as good gas wells. Gas has been known in that territory for years and has been used commercially in that area although salt water has retarded development. Since taking over the prospect, the Louisiana Gas & Fuel Co. has done considerable geophysical and geological work. A rig is up for No. 9 H. C. Minor, following up the numbers of tests drilled by the Terrebonne Gas Co.

Gulf Coast Production

Daily average production of the pools in the Gulf Coast area for the week ending September 27 follows:

SOUTHEAST TEXAS

Allen	32
Barbers Hill	17,716
Batson	1,126
Big Creek	3,403
Blue Ridge	2,043
Brenham	140
Boling	1,009
Clay Creek	2,720
Damon Mound	715
DeWalt	11,451
Fannett	685
Goose Creek	4,584
Hankamer	1,524
High Island	727
Hull	3,132
Humble	17,387
Jasper County	25
Lost Lake	606
Markham	299
Moss Bluff	180
Nash	252
North Dayton	937
Orange	2,175
Orchard	2,040
Pierce Junction	10,600
Port Neches	1,502
Raccoon Bend	12,109
Refugio	28,598
Esperson (Sheeks)	3,397
Saratoga	1,283
Sour Lake	2,213
South Liberty	2,989
Spindletop	15,641
West Columbia	4,131
Total Southeast Texas	162,371
Total week ending September 20	167,652
Decrease	5,281

SOUTH LOUISIANA

Anse La Butte	32
Bayou Blue	35
Bayou Bouillon	154
Black Bayou	345
Edgerly	414
Jennings	2,118
Hackberry	3,636
Lake Barre	1,036
Lake Pelto	99
Lockport	2,544
Port Barre	3,861
Sorrento	65
Starks	692
Sulphur	3,000
Sweet Lake	1,157
Vinton	9,443
Welsh	113
White Castle	1,128
Total South Louisiana	29,863
Week ending September 20	26,590
Increase	3,273
Total Gulf Coast	192,233
Week ending September 20	194,242
Decrease	2,009

GULF COAST FIELDS AND WILDCATS

Week Ended September 27

BARBERS HILL—CHAMBERS COUNTY

Mills Bennett Prod. Co.'s No. 3 L. W. Barber, north — Coring sandy shale showing oil 5,084 ft.
Mills Bennett Prod. Co.'s No. 1 Henry Fisher, southwest — Comp. flowing 1,000 bbls. pipe line oil 6,479 ft.
Mills Bennett Prod. Co.'s No. 4 Gulf-Higgins, southwest — To pump 5,286 ft.
Mills Bennett Prod. Co.'s No. 2 Means (workover) — Pulling screen 5,224 ft.
Humble Oil & Ref. Co.'s No. 6 fee, west — Drlg. hard sand 6,145 ft.
Humphreys Corp.'s No. 1 Fitzgerald, north — Drlg. shale 4,488 ft.
Humphreys Corp.'s No. 1-B Barber, north — Drlg. shale and lime 5,014 ft.
Humphreys Corp.'s No. 9-A Kirby, northwest — Oil sand 6,388 ft.; cmtd. csg. 6,380 ft.
Humphreys Corp.'s No. 6-A Barber, northwest — Drlg. hard sand and lime 4,577 ft.
Humphreys Corp.'s No. 8-B Kirby, northwest — Shale and lime 2,794 ft.; drill stem stuck.
Humphreys Corp.'s No. 2-H Kirby (workover) — Rig up to pump 5,304 ft.
Humphreys Corp.'s No. 2 Scott (workover) — Drlg. shale 7,553 ft.
Humphreys Corp.'s No. 1 Winfree, west — Gumbo 1,650 ft.; cmtd. 13⅜-in. csg.
McAlbert Oil Co.'s No. 1 Higgins (workover) — To pump 5,324 ft.
McAlbert Oil Co.'s No. 1-B Huggins, east — Location.
McAlbert Oil Co.'s No. 5 Woodward (workover) — Set 6 joints screen 5,249 ft.; to pump.
Republic Production Co.'s No. 3 Kirby (workover) — Drlg. sand and shale 6,482 ft.
Rio Bravo Oil Co.'s No. 1 Fisher, southwest — Sand 6,142 ft.; cmtd. csg. 6,105 ft.
Sinclair Oil & Gas Co.'s No. 1 Smith, west — Drlg. lime 4,131 ft.
Sinclair Oil & Gas Co.'s No. 2 Smith, west — Drlg. sand and boulders 1,538 ft.
Sinclair Oil & Gas Co.'s No. 4 McKinney, southeast — Sand and shale showing oil 5,104 ft.; cmtd. csg.
Sun Oil Co.'s No. 6 Chambers (workover) — Drlg. shale 4,555 ft.
Sun Oil Co.'s No. 7 Chambers, south — Derrick.
Sun Oil Co.'s No. 9 Wilburn fee, southeast — Comp. flowing 400 bbls. oil 5,167 ft.
Sun Oil Co.'s No. 10 Wilburn fee, southeast — Oil sand 5,263 ft.; cmtd. csg.
Sun Oil Co.'s No. 11 Wilburn fee, southeast — Sand and shale showing oil 3,450 ft.; cmtd. 7-in. csg.

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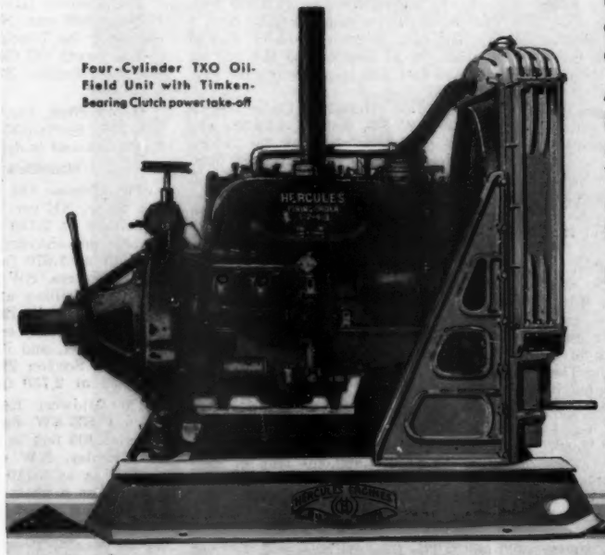

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HERCULES ENGINES

Hobbs Pool Potential Now 600,000 Bbls.

New Completions Make Several Important Extensions to Producing Area. Number of New Locations About to Be Made

By Tolbert R. Ingram
Staff Correspondent, Rocky Mountain Area

DENVER, Colo., Sept. 29.—Eighteen completions in the Hobbs Pool in Lea County, New Mexico, boosted the potential production of the field up to close to 600,000 bbls. a day. The potential as established by the executive committee as of September 16 was 526,044 bbls. from 74 wells. Since then approximately 65,000 bbls. of new production has been brought in. The number of drilling wells has been reduced to 41, the lowest for some time, but a number of new locations are in the offing. New completions make several important extensions to the producing area. The best of the flows were the Ohio Oil Co.'s No. 4 State-Northrup, for 17,000 bbls., and the Humble Oil & Refining Co.'s No. 9 Bowers for 16,416 bbls. The Tidal Oil Co.'s No. 1 Colman, in the Eunice area, had a hole full of sulphur water and after plugging back made 375 bbls. of oil. The Ohio Oil Co.'s No. 1 State McDonald, in this area, and the Texas Pacific Coal & Oil Co.'s No. 1 State, in the Cooper area, also are showing water. R. D. Compton's No. 3 Brainard in Eddy County is flowing 100 bbls. per day and Flynn, Welch & Yates' No. 2 Stevens is a 60-bbl. well.

Conflicting reports concerning the Indian Territory Illuminating Oil Co.'s wildcat in eastern Colorado were set at rest by an official statement that the formations were running normal and that drilling will continue. One new test is starting in Larimer County and another in that county which has been delayed for more than a year is ready to drill into the objective. A small gas well was completed in Montezuma County.

Wyoming has a new black oil field in the Garland Dome where the Ohio Oil Co.'s No. 1 Easton is showing for a producer in the Madison lime. One new operation is starting in the Oregon Basin Field, one completion was reported in Salt Creek, making 728 bbls. of oil and 7,128 bbls. of water, and two wells were completed in the Osage Field in northeastern Wyoming. The Ohio Oil Co. is on top of the Sundance, which is showing gas, in the Lance Creek Field, this being the first well drilled to that horizon.

NEW MEXICO

Hobbs Pool—Lea County

The potential production of the Hobbs Pool in Lea County, New Mexico, on September 16, as established by the proration committee, was 526,044 bbls. daily from 74 wells on 65 units. The allowable outlet for the period September 16-October 1 was placed at 33,250 bbls. daily divided into 126 bbls. per unit for acreage and .046651 of the average unit potential. The average potential per well on September 16 was 7,109 bbls. The average potential per well per day on September 1 was 7,695 bbls., or 415,535 bbls. from 54 wells, and on August 16 was 6,839 bbls. per well daily, or 287,246 bbls. from 42 wells. Pipe line runs for the first half of September were 495,438 bbls., compared with 488,667 bbls. in the last half of August. Total runs since proration has been in effect were 2,202,704 up to the middle of September. Completions since September 15 boosts the field's potential production to more than 591,000 bbls.

The highest potential for any company on September 16 was 77,601 bbls. for the Shell Petroleum Corp., and the Gypsy Oil Co. was second with 69,739 bbls. Since that date, however, Gypsy has taken first place as a result of the completion of its No. 4 Grimes.

The executive committee in charge of proration met at Roswell but only routine matters were discussed and it is understood that no change in the proration agreement is contemplated at this time. It has been noticeable in the past two weeks that the 3-inch tubing is being set lower in the pay than formerly to conserve gas pressure. In some instances the tubing has been run to 175 feet below the top of the pay, but 120 feet is a better average.

Another week passed without any new locations being announced, but it is understood this is a temporary lull in new work and that seven or eight new wells will be spotted within a few days. Several of these will be in Section 6-19-38, as a result of the completion of the first producer in that section by the Atlantic Oil Producing Co. in its No. 1 State, and good offsets to the north and northeast. The Vacuum Oil Co., the Landreth Production Co. and the Shell Petroleum Corp. have acreage to the west and southwest of the Atlantic well which is attractive.

Eighteen wells were completed and 41 wells are drilling. Even if all the expected locations are made, the active operations will remain far below the peak established several weeks ago and will be further reduced by the wells now being completed.

Completions Reported

The completions, including those reported in the pay last week, include the following:

The Ohio Oil Co.'s No. 4 State-Northrup, NW cor. SE Section 32-18-38, joint with the Independent Oil Co., was completed at 4,175 feet as a 17,000-bbl. well, making 25,000,000 feet of gas. It topped the pay at 3,989 feet.

The Amerada Petroleum Corp.'s No. 4 McKinley, SW cor. N WSection 30-18-38, was completed at 4,198 feet and made 328 bbls. of oil the first hour. The gas is rated at 5,000,000 feet.

The Texas Company's No. 2-C State, SE cor. NE Section 25-18-37, at a total depth of 4,210 feet, was given a potential of 9,932 bbls. of oil and 5,000,000 feet of gas. This well, with its offset on the east, Amerada's No. 4 McKinley, extend the productive area half a mile on the southwest.

The Humble Oil & Refining Co.'s No. 9 Bowers, SE SW NW Section 29-18-38, was drilled to 4,220 feet and was given a potential of 16,416 bbls. of oil and 12,000,000 feet of gas.

The Shell Petroleum Corp.'s No. 1 Grimes, SW cor. Section 28-18-28, was drilled to 4,175 feet and rated at 6,156 bbls. of oil and 59,000,000 feet of gas. This is the first well completed in Section 28 and adds about one-fourth of a mile of territory on the eastern side. The heavy gas pressure probably prevented it from being a much larger oil well.

The Empire Gas & Fuel Co.'s No. 1 Hardin, SE cor. NW Section 19-18-38, found the pay at 4,035-4,209 feet and was given a potential of 11,340 bbls. of oil and 10,000,000 feet of gas. The 3-inch tubing was run to 4,159 feet. It topped the anhydrite at 1,441 feet and the brown lime at 2,855 feet. The elevation is 3,662 feet and the first gas was at 2,874 feet and the first oil at 3,253 feet. This is one of three wells in an east-west line that marks the northern limit of producing wells and indicates that there is some good territory remaining to be developed on the northwest.

The Shell Petroleum Corp.'s No. 6 McKinley, NE cor. SW, Section 19-18-38, was completed at 4,200 feet. This is an offset on the south to the Empire's No. 1 Hardin. It found the pay at 4,070-4,200 feet and the 3-inch was run to 4,190 feet. It was given a potential of 11,405 bbls. and 6,200,000 feet of gas. The two wells just named and the Tidal Oil Co.'s No. 1 Hardin and the Shell corporation's No. 5 McKinley comprise the four offsets in the center of Section 19. The Tidal well was given a rating of 8,100 bbls. and No. 5 McKinley had a potential of 5,702 bbls. This group of four wells have a combined potential of 36,547 bbls., or an average of 9,137 bbls. per well.

The Gypsy Oil Co.'s No. 4 Grimes, NE cor. NW, Section 32-18-38, gauged 113 bbls. in 30 minutes from the pay at 3,975-4,153 feet through the tubing and 378 bbls. in one hour, open flow. It also made 18,000,000 feet of gas.

The Landreth Production Co.'s No. 2-B State, 2,310 feet from the north line and 1,320 feet from the west line, NW, Section 33-18-38, one-fourth of a mile out from the nearest producer, was given a potential of 3,758 bbls. of oil and 57,000,000 feet of gas from the pay at 3,960-4,179 feet. The 3-inch tubing is at 4,154 feet. It topped the anhydrite at 1,520 feet and the brown lime at 2,752 feet. The elevation is 3,642 feet. The first gas was at 2,765 feet and the first oil at 3,145 feet.

Farthest Northwest

The Shell Petroleum Corp.'s No. 7 McKinley, NW cor. SW, Section 19-18-38, a diagonal offset on the southeast to the Gypsy Oil Co.'s No. 1 Graham, the farthest northwest of any producer, was given a potential of 7,340 bbls. of oil and 7,340,000 feet of gas. The oil was at 4,015-4,210 feet and the 3-inch tubing is at 4,201 feet. It topped the anhydrite at 1,447 feet and the brown lime at 2,806 feet. The elevation is 3,666 feet.

The Tidal Oil Co.'s No. 2 Grimes, SW SE NE, Section 29-18-38, was credited with a potential of 1,814 bbls.

The Shell Petroleum Corp.'s No. 4 McKinley, SE cor. SW, Section 19-18-38, was drilled to 4,200 feet and is preparing to test. It topped the pay at 4,010 feet.

The Shell Petroleum Corp.'s No. 1 Berry, SE cor., Section 31-18-38, flowed 1,240 bbls. in 12 hours from the pay at 4,040-4,195 feet and is preparing for proration test.

The Midwest Refining Co.'s No. 4 State, NE NW SE, Section 4-19-38, was completed at 4,190 feet with the 3-inch at 4,140 feet and was rated at 2,786 bbls. of oil and 5,000,000 feet of gas. It is an offset on the south to its No. 33 Bowers, one of the largest wells in the pool which was rated at 21,249 bbls. daily capacity.

The Continental Oil Co.'s No. 1-B State, C SW SW, Section 33-18-38, was completed at 4,183 feet and was given a potential of 2,211 bbls. of oil and 3,250,000 feet of gas. The 3-inch tubing is at 4,167 feet.

The Atlantic Oil Producing Co.'s No. 1 State, NE cor., Section 6-19-38, the first well to be completed in that section and an offset on the south and southeast to Shell's No. 1 Berry and Gypsy's No. 5 Grimes, was given a potential of 3,499 bbls. of oil and 1,400,000 feet of gas. The pay was at 4,144-4,205 feet and the 3-inch is at 4,185 feet. It topped the anhydrite at 1,470 feet and the brown lime at 2,810 feet. The elevation is 3,633 feet. The first gas was at 2,821 feet and first oil at 3,270 feet.

The Amerada Petroleum Corp.'s No. 1-B State, SW SE NW, Section 29-18-38, was completed in the lime at 4,036-4,214 feet with the 3-inch at 4,150 feet. It was given a potential of 9,007 bbls. of oil and 6,000,000 feet of gas. Same corporation's No. 2-B State, SE SW NE, Section 29-18-38, topped the pay at 4,040 feet and was drilled to 4,207 feet. It averaged 72 bbls. per hour and was credited with a potential of 1,750 bbls. of oil and 1,700,000 feet of gas per day. However, it is to be deepened with cable tools.

DRILLING OPERATIONS

Routine operations include the following:

The Amerada Petroleum Corp.'s No. 2-A State, NE cor., Section 32-18-38, is drilling at 3,900 feet in anhydrite and lime, and its No. 3-B State, SE NW NE. Section 29-18-38, is shut down at 241 feet. Same company's No. 4-B State, NE cor. NW, Section 29-18-38, is shut down at 242 feet.

The Atlantic Oil Producing Co.'s No. 1 Grimes, SW cor. SE, Section 20-18-38, is drilling at 2,668 feet in anhydrite. The top of the anhydrite was at 1,544 feet, the top of the salt at 1,740 feet and the base of the salt at 2,634 feet. The elevation is 3,648 feet.

The California Co.'s No. 2 State, NE SW SE, Section 29-18-38, is bottomed at 4,171 feet in lime with the 3-inch at 4,150 feet and is ready to be tested. Same company's No. 3 State, SE cor., Section 29-18-38, had 40,000,000 feet of gas at 3,110-11 feet and is mudding, and its No. 4 State, SW cor. SE, Section 29-18-38, cemented the 9⅝-inch at 2,750 feet. Same company's No. 1 McKinley, CSL NW, Section 20-18-38, is drilling at 2,915 feet in anhydrite after cementing the 9⅝-inch at 2,770 feet.

The Continental Oil Co.'s No. 1-A State, SE NW SE, Section 29-18-38, is standing with 7-inch cemented at 3,929 feet, and its No. 2-A State, SE cor. SW, Section 29-18-38, is drilling at 3,858 feet in lime. Same company's No. 3-A State, NE NW SE, Section 29-18-38, is drilling at 3,815 feet in anhydrite and lime and had a show of gas at 3,270-80 feet, and its No. 2-B State, NW cor. SW, Section 33-18-38, cemented the 7-inch at 3,951 feet. Continental's No. 3-B State, CNL SW, Section 33-18-38, is drilling at 3,655 feet in anhydrite and had a show of gas at 2,764 feet and shows of oil and gas at 3,150-70 feet.

The Empire Gas & Fuel Co.'s No. 2 Hardin, SW cor. NW, Section 19-18-38, cemented the 7-inch at 4,020 feet.

The Gypsy Oil Co.'s No. 6 Grimes, SE cor. SW, Section 32-18-38, is drilling at 3,738 feet.

Hobbs High, Inc.'s No. 1 Tatum, NW SW SW, Section 35-18-38, is bottomed at 3,862 feet and is drilling up bailer.

Humble's Operations

The Humble Oil & Refining Co.'s No. 1-A State, NE cor. SE, Section 25-18-38, is drilling at 2,139 feet in anhydrite. It topped the anhydrite at 1,490 feet and the salt at 1,670 feet. Same company's No. 8 Bowers, SW cor. SE, Section 30-18-38, is drilling at 4,019 feet in lime. Humble's No. 10 Bowers, NE NW SW, Section 29-18-38, cemented the 9⅝-inch at 2,750 feet, and its No. 1 Grimes, SW NE NE, Section 29-18-38, cemented the 9⅝-inch at 2,750 feet.

The Midwest Refining Co.'s No. 26 State, C SE SW, Section 4-19-38, is drilling at 1,405 feet in red rock, and its No. 6 McKinley, NW cor., Section 5-19-38, is drilling at 3,710 feet in sand. Last named has a show of gas at 2,807 feet and a show of oil at 3,205-25 feet and a show of gas at 3,703-10 feet. Midwest's No. 26 Terry, C SE SE, Section 9-19-38, is drilling at 3,860 feet in lime, and its No. 1 McKinley, NE cor. NW, Section 5-19-38, is drilling at 1,920 feet in salt. Last named topped the anhydrite at 1,425 feet and the salt at 1,618 feet. Same company's No. 29 Turner, C SW SW, Section 34-18-38, spudded on September 11 and cemented the 15½-inch at 196 feet.

The Ohio Oil Co.'s No. 2 State, SE cor. SW, Section 30-18-38, is drilling at 3,995 feet in lime, and its No. 3 State, NW cor. SW, Section 30-18-38, is drilling at 3,629 feet in anhydrite and lime. The last named had the first gas at 2,830 feet and the first oil at 3,240 feet. Same company's No. 5 State-Northrup, SW cor. SE, Section 32-18-38, had the

(Continued on Page 319)

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California Shows Substantial Decline

Most of Reduction Made by Barnsdall and Rio Grande in Tideland Wells at Elwood. Most Severe Curtailment Yet

By L. P. Stockman
Staff Correspondent, California Fields

LOS ANGELES, Calif., Sept. 27.—Crude oil production in California showed a substantial decline this week due to shutting in of additional production in conformity with the revised curtailment program which contemplates the reduction of state production to 550,000 bbls. per day. An additional curtailment was made in a number of fields during the week with the Elwood Field of Santa Barbara County heading the list. Daily production in this field was cut back from 49,420 bbls. to 26,910 bbls., a reduction of 22,510 bbls. Most of this reduction was made by the Barnsdall and Rio Grande when these operators shut down four producing wells on Tideland permit No. 88. These four wells were shut in completely and will continue off production for another week or so. This is the most severe curtailment made by any operator in California up to the present time, as this property has a rated potential of 40,000 bbls. per day. The maximum reduction necessary to bring state production down to its allotment of 550,000 bbls. per day is not expected to be attained until after October 1, as there are a number of fields, particularly those in the settled stage, where curtailment is based on monthly production. This is accomplished by suspending pumping activities during one week of the month or pumping only during daylight.

During the month of August, the latest figures available, California produced 605,499 bbls. per day, as compared with 606,517 bbls. in July, and 878,495 bbls. in August of last year. During August, Elwood, Ventura Avenue, Santa Fe Springs and a number of other minor fields registered declines from the previous month, while Long Beach, Huntington Beach and Playa Del Rey showed increases. Total fluid stocks held on the Pacific Coast reflecting curtailment work declined 1,032,155 bbls., bringing total stocks down to 181,223,790 bbls. at the close of August. Heavy crude and fuel declined 818,545 bbls; light crude, 128,246 bbls.; gasoline, 183,708 bbls., and naphtha distillates, 191,048 bbls., while the remaining petroleum products increased 289,392 bbls.

Playa del Rey Leads

Playa Del Rey headed the completion list this week, although none of the wells finished registered particularly large production. The Pacific Western Oil Co. finished its first producing well at Playa Del Rey this week when No. 1 Stanley Leiber was brought in under a natural flow doing 570 bbls. per day from the deep Recreation zone at 5,961 feet. J. L. Clarke's No. 1 Venice was completed flowing 748 bbls. per day from 6,219 feet, while the Pacific Shore Oil Co.'s No. 2 Strain at Fortieth and Speedway was good for 346 bbls. initially from the upper zone at 4,578 feet. J. M. Devere's No. 1 Baby Joe came in during the early part of the week flowing at the rate of 400 bbls. per day from 6,360 feet but subsequently died. It is at the present time being cleaned out and should be on production again shortly. The Star Petroleum Co. finished its third producer in this field when No. 3 Venice was brought in flowing 551 bbls. per day from 6,407 feet, the hole having been finished with a 4¾-inch perforated liner.

The California Northern Corp. has recompleted No. 1 Lindblade doing 350 bbls. per day from 6,359 feet but this new producer does not have much kick and may require careful supervision in order to maintain steady production. George F. Getty Oil Co. completed No. 3 Venice in the upper zone at 4,185 feet, and, while this new well may require further work, it is flowing by heads at the rate of 375 bbls. per day. The El Camino Oil Co. recompleted No. 1 Venice and this deep zone well has been returned to production doing 285 bbls. per day from 6,230 feet. This company is experiencing some difficulty in securing sustained production in No. 3 Venice, bottomed at 6,055 feet and finished with a 4¾-inch liner carrying 155 feet of perforated, but it should get under way shortly.

Playa Del Rey's first unsuccessful well was chalked up this week when the Venice Oil Syndicate abandoned its No. 2 because of mechanical trouble at 4,257 feet. The Metropolitan Oil Co.'s No. 1 Venice, which blew out late last week from 2,875 feet and subsequently caught fire, has been brought under control although the damage sustained to the hole has not yet been ascertained. The fire in this well was extinguished by the large volume of mud and water which broke into the hole after the well had burned for approximately 48 hours. The most significant thing in connection with this blowout is the shallow depth from which the gas emanated. None of the other wells at Playa Del Rey have logged this gas zone between the surface and 2,875 feet and consequently the crew on this project was totally unprepared. The McDonald Petroleum has been unable to complete its No. 1 Venice, bottomed at 6,118 feet and finished with a 4¾-inch liner carrying 310 feet of perforated, due to insufficient gas pressure and preparations are being made to put it on the beam as its failure to respond to artificial stimulation extending over a period of two weeks definitely indicates the absence of sufficient gas to result in a natural flow.

Long Beach

Four wells were put on production in the Long Beach Field during the past week, one of which was a recompletion. This was the Ray Oil Co.'s No. 1 Patton Avdell, which was returned to production flowing 260 bbls. of 27.1 gravity oil per day after being redrilled and deepened to 7,268 feet. The largest well finished was the M.&A. Oil Co.'s No. 1 Painted Hills, a new well brought in flowing 916 bbls. of clean 28.1 gravity oil initially from 6,895 feet, the hole having been finished with a 6⅝-inch liner carrying 606 feet of perforated. The General Petroleum's No. 4 Kelly, a new well finished at 7,220 feet, proved a distinct disappointment as it was only good for 95 bbls. per day on a compressor, the output showing a cut of 20 per cent. George F. Getty's No. 18 Signal, another new well finished this week, was also a disappointment, although it registered a little better production than No. 4 Kelly of the General Petroleum. This new well, bottomed at 7,169 feet but plugged back to 7,050 feet, failed to have sufficient kick to result in a natural flow. It was consequently put on a compressor and was finished doing 140 bbls. of 28.6 gravity oil per day.

Huntington Beach

The electorate of Huntington Beach defeated four propositions at a general election this week on the assumption that they would have placed an undue hardship on the oil industry which has added considerable revenue to the city of Huntington Beach and substantially increased the taxable wealth of Orange County. The propositions in question required applicants to file a financial statement before initiating drilling and the posting of a $5,000 bond to guarantee the restoration of property upon conclusion of work. Proposition No. 3 required operators to make satisfactory provision for the disposal of waste water, oil and rotary mud while proposition No. 4 prohibited the erection of any wooden derricks within 125 feet of any other rig. All four propositions were defeated by the voters.

Two or three new wells are expected to be completed in the Huntington Beach Field within the next 10 or 15 days, all of them being bottomed in the shallow zone. The Superior Oil Co. has reached a depth of 5,410 feet in No. 1 Fee, a deep test being carried down in search of lower production. The Transport Oil Co.'s No. 17 Huntington, another deep test under way in this field, is rotating ahead at 5,990 feet with no favorable indications logged up to the present time. Two new wells are also expected to be finished in the Inglewood Field of Los Angeles Basin, both of them oeing drilled by the Standard Oil Co. One of these projects, well No. 25 on Vickers Lease No. 1, is of particular interest as it is being drilled with direct electric current in contrast with the usual method which uses alternating current. This equipment, consisting of a self-contained Diesel electric drive, is the same equipment used in the drilling of well No. 24 on the same lease, which was brought in a few months ago. These two wells have been drilled for the specific purpose of ascertaining the feasibility of utilizing this equipment in general practice. A careful check is being kept of operating costs in order that a fair comparison may be made with equipment using alternating current and the usual steam equipment. The Associated Oil Co. is abandoning 33 additional wells on its Salt Lake lease, located in the Salt Lake Field of

TANKER SHIPMENTS FROM LOS ANGELES TO ATLANTIC AND GULF COAST PORTS

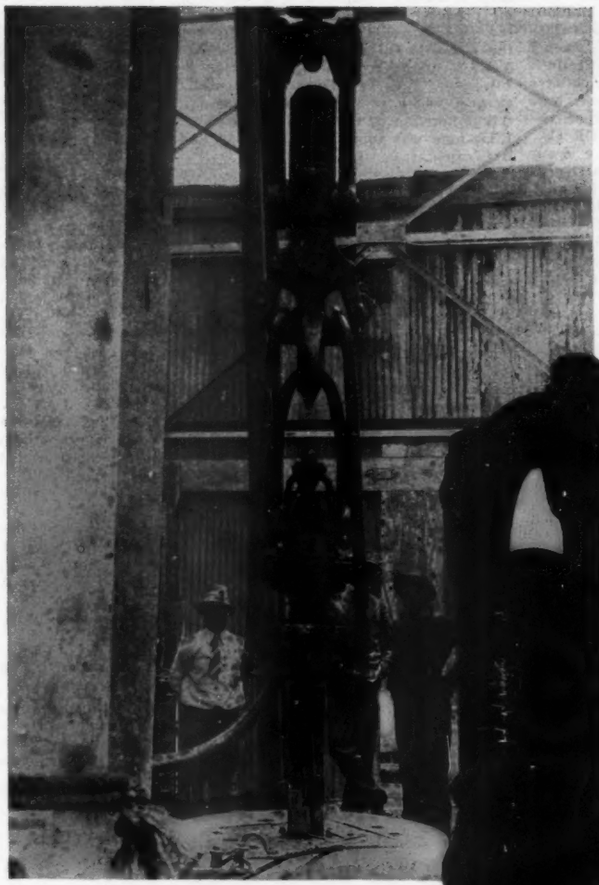
Commodity—	Total this week	Daily average	Total last week	Daily average	This year to date	Same time last year
Crude oil	.....	.....	.....	.....	68,690	997,250
Fuel oil	.....	.....	.....	.....	71,950	49,950
Diesel and gas oil	65,213	9,316	76,545	10,935	2,592,518	1,561,897
Gasoline	153,341	21,906	420,059	60,008	14,365,533	15,071,051
Naphtha distillate	.....	.....	.....	.....	.....	81,750
Coastwise—						
Crude oil	231,000	33,000	451,010	64,430	11,327,219	19,656,716
Fuel oil	358,279	51,197	516,676	73,811	12,658,617	14,406,597
Diesel and gas oil	37,161	5,309	.....	.....	1,218,099	891,160
Gasoline	245,836	35,119	240,699	34,386	9,411,137	7,962,704
Kerosene	4,122	589	10,620	1,517	149,256	67,031
Exports—						
Crude oil	172,277	24,611	138,820	19,831	5,091,597	4,219,548
Fuel oil	496,739	70,963	319,150	45,593	13,349,663	13,042,602
Diesel and gas oil	43,051	6,150	86,932	12,419	3,291,961	1,925,006
Gasoline	287,836	41,119	127,054	18,151	11,799,281	8,636,244
Kerosene	80,951	11,564	17,675	2,525	2,913,422	2,421,831
Lubricants	.....	.....	.....	.....	14,680	.....

TANKER SHIPMENTS FROM SAN FRANCISCO TO ATLANTIC AND GULF COAST PORTS

Diesel and gas oil	.....	.....	.....	.....	279,088	.....
Gasoline	77,660	11,094	.....	.....	1,008,757	1,583,425
Lubricants	.....	.....	.....	.....	24,774	138,706
Coastwise—						
Fuel oil	42,110	6,016	109,036	15,577	2,488,264	2,024,814
Diesel and gas oil	.....	.....	15,740	2,249	206,256	342,313
Gasoline	70,410	10,059	133,060	19,009	2,999,574	3,677,141
Kerosene	.....	.....	18,248	2,607	176,747	122,691
Exports—						
Crude oil	.....	.....	.....	.....	3,075	121,603
Fuel oil	.....	.....	.....	.....	662,135	657,681
Diesel and gas oil	52,950	7,564	.....	.....	451,779	261,565
Gasoline	137,750	19,679	74,270	10,610	2,995,292	4,095,990
Kerosene	24,980	3,569	.....	.....	533,508	406,730
Lubricants	13,730	1,961	.....	.....	33,579	25,713

IMPORTANT SOUTHERN CALIFORNIA WILDCATS

Union, No. 1 Orchard Dale, Los Angeles Co.	10- 3-11	4,790	sd. sh. drilling
Olympic Realty Corp., No. 1 Venice, Los Angeles Co.	14- 2-15	3,370	sd. sh. drilling
Dwyer & Becker, No. 1 Compton, Los Angeles Co.	17- 3-13	4,490	cleaning out
Francis, Don, No. 1 Compton, Los Angeles Co.	8- 3-13	572	recemented
Carlyn, C. H., No. 2 Compton, Los Angeles Co.	9- 3-13	636	sd. sh. drilling
Central Oil Co., No. 1 Compton, Los Angeles Co.	28- 3-13	5,094	suspended
Combs, E., No. 1 Compton, Los Angeles Co.	16- 3-13	575	sd. drilling
Guajome Oil Co., No. 1 El Nido, Los Angeles Co.	33- 3-14	rig	suspended
Cal. Ventura Oil Co., No. 1 Manhattan, Los Angeles Co.	30- 3-14	6,525	suspended
Cal. Ventura Oil Co., No. 1 Hermosa, Los Angeles Co.	31- 3-14	3,396	testing
Cal. Ventura Oil Co., No. 2 Hermosa, Los Angeles Co.	31- 3-14	rig	suspended
McMahon & McDonald, No. 1 Watts, Los Angeles Co.	12- 3-14	4,665	suspended
McKeon Drlg. Co., No. 1 Watts, Los Angeles Co.	1- 3-14	mtl.	building rig
Rio Grande Oil Co., No. 1 Watson, Los Angeles Co.	17- 4-13	6,295	fishing
Tenacity Oil Co., No. 1 Dominguez, Los Angeles Co.	11- 4-13	8,580	testing
Shell, No. 1 Van Nuys, Los Angeles Co.	19- 2-15	4,975	hd. sd. drilling
Rio Hondo Pet., No. 1 Puente, Los Angeles Co.	14- 2-10	3,455	testing
Rucker & Smith, No. 2 Puente, Los Angeles Co.	27- 2-10	rig	rigging up
Bidart Oil Co., No. 1 Puente, Los Angeles Co.	15- 2-10	2,895	sd. sh. drilling
Bardeen Pet., No. 1 Puente, Los Angeles Co.	9- 2-10	5,000	suspended
Keck & Hall, No. 1 Puente, Los Angeles Co.	32- 2- 8	1,120	gas—shut in
Marcel Pet. Co., No. 1 Puente, Los Angeles Co.	31- 2- 8	2,920	br. sh. drilling
Celito Oil Co., No. 1 Monterey Park, Los Angeles Co.	25- 1-12	5,278	testing
Los Gatos Oil Co., No. 1 El Monte, Los Angeles Co.	16- 1-11	1,950	suspended
Olympic Corp., No. 1 Calabasas, Los Angeles Co.	18- 1-17	6,695	redrilling
Union, No. 1 Coyote Sansinena, Los Angeles Co.	30- 2-10	4,809	recemented
Western Gulf, No. 1 Brea Canyon, Los Angeles Co.	28- 2- 9	6,700	hd. sd. drilling
Lamona Oil Co., No. 1 Pomona, Los Angeles Co.	34- 1- 9	965	hd. sd. drilling
Graham & Loftus, No. 1 Coyote, Orange Co.	18- 3- 9	6,723	to set pipe
Nesa Pet., No. 1 Newport, Orange Co.	21- 6-10	4,910	suspended
Hall, H. L., No. 1 Newport, Orange Co.	20- 6-10	790	suspended
Standard, No. 1 Newport, Orange Co.	26- 6-10	2,091	hd. sd. drilling
Fidelity Pet. Co., No. 1-A Murrietta, Riverside Co.	23- 7- 3	1,010	cleaning out
Hemet Pet. Co., No. 1 Ward, Riverside Co.	9- 5- 1	3,560	suspended
Imperial Valley Oil Co., No. 1 Brawley, Imperial Co.	36-11-10	3,240	suspended
McGregor Synd., No. 1 Del Mar, San Diego Co.	17-14- 3	1,265	cleaning out
Borderland Oil Co., No. 1 Encinitas, San Diego Co.	12-13- 4	2,519	suspended
Borderland Oil Co., No. 1 Point Loma, San Diego Co.	30-16- 3	4,130	gr. sd. drilling
Carr, O. K., No. 1 Capistrano, San Diego Co.	13- 8- 8	4,450	hd. sd. drilling
Grey, H. H., No. 1 Redlands, San Bernardino Co.	25- 1- 2	2,375	hd. sd. drilling
Girard & Grimes, No. 1 Corona, San Bernardino Co.	8- 2- 8	1,549	cemented
Western Gulf, No. 1 Santa Ana, Orange Co.	12- 3- 8	mtl.	idle



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Los Angeles Basin, and upon conclusion of this work will quitclaim the property in question as plans have already been formulated by the lessor, G. Allan Hancock, to subdivide this property as it is particularly desirable for residential purposes.

San Joaquin Valley

Two wells were put on production in the Maricopa Flats section of the Midway-Sunset Field during the past week and a check indicates the probable completion of several more in the near future. The new wells finished this week were No. 9 Son-Crail of the Doyle Petroleum Co., which was good for 305 bbls. of exceptionally clean 22.6 gravity oil per day from 3,754 feet, and No. 2 Kerckhoff of the North American Consolidated, which came in flowing 135 bbls. initially from 4,420 feet. The Wellington Oil Co. put its No. 4 Sunset on a preliminary production test at 3,518 feet but has subsequently re-entered the hole following the failure to develop a natural flow. The Kettleman Hills Field continued to produce approximately 24,000 bbls. per day during the week and this will probably be substantially increased in the near future by additional completions unless unit development or compulsory regulation becomes effective in the meantime.

Possible New Field

The Chanslor-Canfield Midway Oil Co., which appears to have opened up a new field east of the Rincon Field of Ventura County, has taken No. 2-A Hobson off the compressor, installed a few weeks ago, and is rigging up rotary equipment to deepen. This well, located in Section 23-3-24, has been producing approximately 200 bbls. per day from 7,479 feet, but the output has been cutting approximately 25 per cent. The Ohio Oil Co. is making preparations to start a deep test in the North Belridge Field of Kern County and drilling should get under way within the next few weeks. The Belridge Oil Co. is cleaning out its No. 15 Fee, the deep well which focused the attention of operators on the North Belridge area when it registered deep production a few months ago, and a few hundred feet of hole will be added in the hope of developing substantial production. The Richfield Oil Co., Rio Grande, General

(Continued on Page 343)

IMPORTANT NORTHERN CALIFORNIA WILDCATS

Company, well, location—	S-T-R	Depth	Status
Standard, No. 1 Point Conception, Santa Barbara Co.	X- 5-34	6,201	hd. sd. drilling
Universal, No. 1 Pt. Conception, Santa Barbara Co.	30- 5-34	4,910	hd. sd. drilling
Prairie Oil Co., No. 1 Lompoc, Santa Barbara Co.	15- 7-35	5,470	hd. sd. drilling
Fields Gas Co., No. 1 Santa Maria, Santa Barbara Co.	8- 9-33	5,314	sd. sh. drilling
Western Gulf, No. 1 Santa Maria, Santa Barbara Co.	5- 9-33	3,177	sd. sh. drilling
Barnsdall, No. 1 Gato Ridge, Santa Barbara Co.	9- 8-32	4,020	sd. sh. drilling
Midwest Oil Co., No. 1 Los Alamos, Santa Barbara Co.	2- 7-33	rig	standing
General Pet., No. 1 Goleta, Santa Barbara Co.	21- 4-28	4,533	shut in
General Pet., No. 2 Goleta, Santa Barbara Co.	21- 4-28	4,350	suspended
General Pet., No. 3 Goleta, Santa Barbara Co.	21- 4-28	2,090	sd. sh. drilling
General Pet., No. 134 Goleta, Santa Barbara Co.	21- 4-28	1,485	suspended
General Pet., No. 136 Goleta, Santa Barbara Co.	21- 4-28	1,016	suspended
General Pet., No. 137 Goleta, Santa Barbara Co.	21- 4-28	1,026	suspended
General Pet., No. 138 Goleta, Santa Barbara Co.	21- 4-28	4,931	suspended
General Pet., No. 139 Goleta, Santa Barbara Co.	21- 4-28	1,035	suspended
General Pet., No. 143 Goleta, Santa Barbara Co.	21- 4-28	1,040	suspended
Boles Oil Co., No. 140 Goleta, Santa Barbara Co.	22- 4-28	1,040	suspended
U. S. Pet., No. 141 Goleta, Santa Barbara Co.	20- 4-28	1,035	suspended
U. S. Pet., No. 142 Goleta, Santa Barbara Co.	20- 4-28	1,032	suspended
U. S. Pet., No. 143 Goleta, Santa Barbara Co.	20- 4-28	1,019	suspended
El Camino, No. 149 Goleta Tideland, Santa Barbara Co.	22- 4-28	1,035	suspended
Bolsa Chica, No. 191 Goleta, Santa Barbara Co.	24- 4-29	2,112	sd. sh. drilling
Caldwell Brown, No. 159 Goleta, Santa Barbara Co.	24- 4-29	1,040	suspended
Cochran, J. H., No. 1 Naples, Santa Barbara Co.	7- 4-29	3,490	sd. sh. drilling
Johnson, George, No. 1 Goleta, Santa Barbara Co.	X- 4-28	3,970	cleaning out
Wildcat Oil Co., No. 1 Santa Maria, Santa Barbara Co.	20-10-35	5,500	fishing
Pacific Western, No. 1 Gibraltar, Santa Barbara Co.	14- 5-27	2,345	suspended
Shell, No. 5 Oxnard, Ventura Co.	14- 2-20	3,275	sd. sh. drilling
Prairie Oil & Gas Co., No. 1 Ventura, Ventura Co.	30- 3-22	7,460	D.P. froze
Rio Grande, No. 1 Lankershim, Ventura Co.	13- 4-19	2,000	redrilling
Associated, No. 1 Rincon Creek, Ventura Co.	19- 4-24	2,080	suspended
Pure Oil Co., No. 1 S. P. Canyon, Ventura Co.	15- 4-21	2,114	sd. sh. drilling
California Republic, No. 1 Sespe, Ventura Co.	23- 4-21	rig	rigging up
Superior Oil Co., No. 1 Sespe, Ventura Co.	14- 4-21	1,290	hd. sd. drilling
Lockwood Valley Oil Co., Well No. 1, Ventura Co.	32- 2-21	rig	suspended
Nordon Oil Co., No. 1-A Buttonwillow, Kern Co.	7-29-24	5,065	fishing
General Pet., No. 1 Belridge, Kern Co.	30-28-21	629	sd. sh. drilling
Belridge Oil Co., No. 1 Belridge, Kern Co.	36-27-20	5,408	will deepen
Richfield, No. 1 Belridge, Kern Co.	20-27-20	4,850	redrilling
Ohio Oil Co., No. 1 Belridge, Kern Co.	36-27-20	....	location
Rio Grande, No. 1 Belridge, Kern Co.	18-28-22	3,680	redrilling
Shell, No. 1 Belridge, Kern Co.	25-28-20	914	abandoned
Shell, No. 2 Belridge, Kern Co.	23-28-20	100	core hole
Shell, No. 3 Belridge, Kern Co.	24-28-20	rig	core hole
Wallace, K. C., No. 1 Belridge, Kern Co.	32-29-21	3,735	hd. sd. drilling
Shell, No. 1 Weed Patch, Kern Co.	29-30-29	5,370	cleaning out
Pet. Sec., No. 1 Edison, Kern Co.	14-29-29	3,580	redrilling
Symark Oil Co., No. 1 Edison, Kern Co.	24-29-29	2,130	suspended
Sayre, F. M., No. 1 Edison, Kern Co.	5-30-29	4,320	suspended
Standard, No. 1 Devils Den, Kern Co.	14-25-18	mtl.	building rig
Shell, No. 1 Semitropic, Kern Co.	17-27-23	6,075	hd. sd. drilling
Moran & DeCamp, No. 1 Mojave, Kern Co.	26-10-14	660	hd. sd. drilling
Meridan Oil Co., No. 1 Antelope, Kern Co.	11- 9-15	3,000	hd. sd. drilling
Bardeen, H. A., No. 1 San Emidio, Kern Co.	18-10-23	1,190	suspended
Bardeen, H. A., No. 2 San Emidio, Kern Co.	10-10-23	3,998	hd. sd. drilling
Stabler, W. W., No. 1 Commanche Pt., Kern Co.	4-11-18	2,040	suspended
Ritchie J. J., No. 1 Tejon, Kern Co.	33-11-19	4,077	hd. sd. drilling
Wrenn, J., No. 1 Antelope Plains, Kern Co.	32-25-17	812	suspended
Ohio Oil Co., No. 1 Coalinga, Fresno Co.	8-21-15	4,595	sd. sh. drilling
Associated, No. 1 Jacalitos, Fresno Co.	22-21-16	rig	rigging up
Petroleum Securities, No. 2 Huron, Fresno Co.	28-20-16	7,390	suspended
Panorama Oil Co., Well No. 1, San Luis Obispo Co.	7-31-21	4,019	suspended
Kent & McDonald, No. 1 Carizzo, San Luis Obispo Co.	3-32-22	1,260	br. sh. drilling
Latin Amer. Pet., No. 1 Shandon, San Luis Obispo Co.	21-27-15	4,525	suspended
Paso Robles Synd., No. 1 Creston, San Luis Obispo Co.	27-27-11	3,941	cleaning out
Schilling, C., No. 1 Atascadero, San Luis Obispo Co.	24-28-12	410	sd. sh. drilling
Pismo Dome Oil Co., No. 1 Edna, San Luis Obispo Co.	5-31-13	2,940	sd. sh. drilling
Standard, No. 1 King City, Monterey Co.	23-22- 7	5,490	hd. sd. drilling
O'Donnell, J. E., No. 1 Dudley Ridge, Kings Co.	7-23-20	1,635	gas well—idle
Friend & Fiske, No. 1 Tulare Lake, Kings Co.	11-23-18	518	sd. drilling
Penn Western, No. 1 Tulare Lake, Kings Co.	24-21-18	1,338	suspended
Wellport Oil Co., No. 1 Devils Den, Kings Co.	9-24-17	3,940	suspended
Twin State Oil Co., No. 1 Point Arena, Mendocino Co.	14-13-17	4,550	sd. sh. drilling
Oakdale Oil Co., No. 1 Oakdale, Stanislaus Co.	3- 2-10	3,535	suspended
Orinda Pet., Well No. 1, Contra Costa Co.	32- 1- 3	712	sd. sh. drilling
White, Roy, No. 1 Pixley, Tulare Co.	8-23-26	4,495	hd. sd. drilling
Campbell Oil Co., No. 1 Porterville, Tulare Co.	22-22-27	521	sd. sh. drilling
Terra Bella Oil Co., No. 1 Porterville, Tulare Co.	35-22-27	918	pumping
Western Oil Co., No. 1 Porterville, Tulare Co.	35-22-27	1,022	testing
Mills & Wilson, No. 1 Porterville, Tulare Co.	35-22-27	913	testing
Jennings Synd., No. 1 Porterville, Tulare Co.	8-23-28	416	sd. sh. drilling
Terra Bella Drlg. Co., No. 2 Porterville, Tulare Co.	34-22-27	920	testing
Jaques Oil Co., No. 1 Porterville, Tulare Co.	34-22-27	914	suspended
Rayatt Oil Co., No. 1 Porterville, Tulare Co.	34-22-27	770	testing
Hallock, William, No. 1 Porterville, Tulare Co.	34-22-27	1,090	suspended
Kern Pet. Co., No. 1 Porterville, Tulare Co.	34-22-27	614	sd. sh. drilling
Larson Oil Co., No. 1 Porterville, Tulare Co.	11-23-27	890	sd. sh. drilling
Hagerty & Caine, No. 1 Porterville, Tulare Co.	2-23-27	816	sd. sh. drilling
Alexander, Ford, No. 1 Porterville, Tulare Co.	34-22-27	1,000	testing
Kettleman Trust, No. 1 Porterville, Tulare Co.	21-22-27	116	sd. drilling
Lewis, Paul M., No. 1 Porterville, Tulare Co.	15-22-27	775	recemented
Turk & Campbell, No. 1 Porterville, Tulare Co.	34-22-27	699	sd. sh. drilling
Wells & Armstrong, No. 1 Porterville, Tulare Co.	10-23-27	114	sd. drilling
Colusa Oil Co., No. 1 Bush, Colusa Co.	31-15- 4	700	hd. sd. drilling
Getty Oil Co., No. 1 Nigger Heaven, Yolo Co.	23-12- 3	1,995	sd. sh. drilling

MICHIGAN HAD ONLY ONE PRODUCER AND FOUR DRY HOLES DURING WEEK

By Paul A. Elliott

MUSKEGON, Mich., Sept. 29.—Michigan operators completed only one new oil producer and four dry holes during the past week. The lone producer was the G-Lee-P Oil Development Co.'s No. 5 E. Grubb, SW NW SW, Section 2-14n-3w, Chippewa Township, Isabella County, which made 200 bbls. a day initial production in the Dundee formation. Limestone was topped at 3,518 feet and pay sands from 3,570-89 feet.

The most disappointing of three dry holes in the Mount Pleasant area was Benedum-Trees Oil Co.'s No. 1 Grove, NW NW SE, Section 14-15n-7w, Sheridan Township, Mecosta County. It is west of the Broomfield gasser region and was dry in the Dundee at 3,904 feet.

Two Gratiot County wildcats were dry. The Twin City Oil & Gas Co.'s No. 1 C. H. Rigsby, Section 1-12n-3w, Pine River Township, topped the Dundee at 3,470 feet, had a gas and oil show at 3,475 feet and struck bottom water at 3,490 feet. The Wolverine Natural Gas Co.'s No. 1 Kerr, SE SW, Section 9-9n-1w, Elba Township, will be abandoned at 750 feet after failing to get gas in the Parma formation where it was expected.

Of several new wells being started in Clare County one or more will be drilled with a rotary outfit yet untried in the Mount Pleasant area.

One of five new locations is to be the Leonard Petroleum Co.'s No. 1 Wezensky, NW SW NE, Section 30-15n-3w, Denver Township, Isabella County. Permits for two new wells to be drilled in and near the Muskegon oil field were filed. One is for the Reed Oil Co.'s second structure test in Fruitland Township and the other is for the Lima Oil Corp.'s No. 9 Louis P. Haight, SW SW SE, Section 9-10n-16w, Muskegon Township, Muskegon County, in the proved field and on the Muskegon River Flats. The new Reed test will be No. 1 A. Starre, SE NW SW, Section 9-11n-17w, Fruitland Township. Several other wells are active in the field including the Muskegon Deep Well Syndicate's No. 1 Heinz, the first deep test in the proved field.

Newaygo Wildcat

The Atlantic Exploration Co. has obtained a permit for a new Newaygo County wildcat to be known as No. 1 Stone, in the SE, Section 27-12n-14w, Sheridan Township. It will be the company's third wildcat in the county. The other two were dry. The second one having been completed last week at 2,303 feet. Corbitt and Thornton's No. 1 Ponstantine, SW NE SW, Section 21-6n-14w, Blendon Township, near the southeast corner of Ottawa County, is dry at about 2,600 feet and will be plugged and abandoned. The Michigan Petroleum Co.'s No. 1 C. E. Moe, SE SE, Section 6-9n-13w, Chester Township, Ottawa County, near the village of Ravenna, is being tubed and tested for a show of gas. It is 6,310 feet, and is the deepest oil well ever drilled in Michigan.

Thompson Brothers, former Muskegon contractors, are deepening two wells originally drilled in Logan Township, Mason County, near Walla Halla, by the firm of Taggart & Welsh. Two of the Taggart & Welsh wells made gas in the Niagara limestone and and third was an initial 92-bbl. oil well in the upper Traverse formation. The Island Oil & Gas Co.'s No. 1 Krispen, private claim No. 4, Township 2n, Range 16e, Clay Township, St. Clair County, is the latest new wildcat to be started on Hansen Island in the St. Clair River. A permit was issued last week.

NEW SOUTH TURNER VALLEY WELL LOOKS LIKE COMMERCIAL PRODUCER

By Victor Lauriston
Staff Correspondent, Canadian Fields

CHATHAM, Ontario, Sept. 27.—In the South Turner Valley, East Crest Oil Co.'s No. 1, LSD 5-6, Section 16-19-2w5, looks like a fair commercial producer after a shot of 300 quarts in the lime at 4,675 feet. The well has about 375 feet of the lime, 140 feet being porous, and a strong flow of gas with lime particles followed the shot. The well after cleaning itself of rock fragments is being tested on the separator. East Crest's No. 2-A, LSD 4, same section, is drilling more than 215 feet in the lime at about 4,458 feet. The East Crest wells are located on the eastern flank of the Turner Valley structure and about a mile east of the Home Oil Co. producers.

It is reported that negotiations now in progress may result in resumption of work on the two Midwest Oil Co. wells in Central Turner Valley.

Central Turner Valley

In Section 1-20-3w5, Central Turner Valley, Okalta's No. 1 is cementing cellar and repairing casing to overcome water seepage between casing from the top of the well. This seepage froze and caused casing collapse, materially interfering with production. The well originally made close to 500 bbls. a day. Okalta's No. 3, LSD 9, is drilling in the limestone around 4,550 feet after encountering considerable wet gas. Okalta's No. 2, LSD 8, standing 72 feet in the lime at 4,852 feet, is preparing to change to diamond drill outfit to complete the well.

McLeod Oil Co.'s No. 5, LSD 15, Section 1-20-3w5, is reported drilling in the lower Fernies at 4,840 feet. McLeod's No. 1, LSD 16, where iron in the hole is interfering with production from the lime, is using acid in an effort to remove the obstruction.

Richfield Petroleums' No. 2, LSD 12-13, Section 13-20-3w5, is reported drilling below 100 feet with cable tools. This is the latest test to start drilling in Central Turner Valley. The latest Imperial Oil progress report shows only nine tests drilling, including eight in the Turner Valley Field and one in Waite Valley. Mayland's No. 4, in Section 17-19-2w5, was located by Imperial Oil, Ltd., some time ago, but no subsequent work has been reported, and Home's No. 7, which was started some time ago, has been standing inactive for several weeks.

A recent summary of Turner Valley drilling operations shows in the central field a total of 11 wells drilling more or less steadily, 11 standing and 36 producers, though a number of these have merely nominal yield. In South Turner Valley there are 11 tests drilling, 11 standing, and 22 that can be called producers. North Turner Valley has 7 tests standing, 2 deep lime producers, 1 small light crude producer and 1 gasser. No drilling is going on at the immediate moment in the northern end of the field.

Shot at Pincher Creek

In the Pincher Creek area, southern foothills, Weymarn Petroleums' No. 2, LSD 5, Section 7-6-1w5, is reported to have been shot after drilling through a coal seam into hard rock below 2,000 feet. Gas was met in several of the upper horizons, with an aggregate flow estimated at 1,000,000 feet a day; but results of the shot are not yet known.

In the border fields of southern Al-

(Continued on Page 344)

JACKSON

EXPERIENCE

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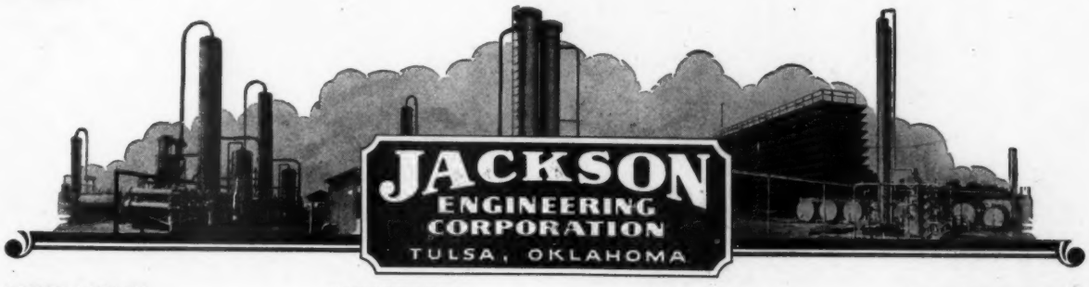
Port Arthur, Texas
Sweetwater, Texas
Pampa, Texas
Channing, Texas

Oklahoma City, Oklahoma
Seminole, Oklahoma
Cromwell, Oklahoma
McCamey, Texas
Gordon, Texas
Baton Rouge, Louisiana
Shiprock, New Mexico



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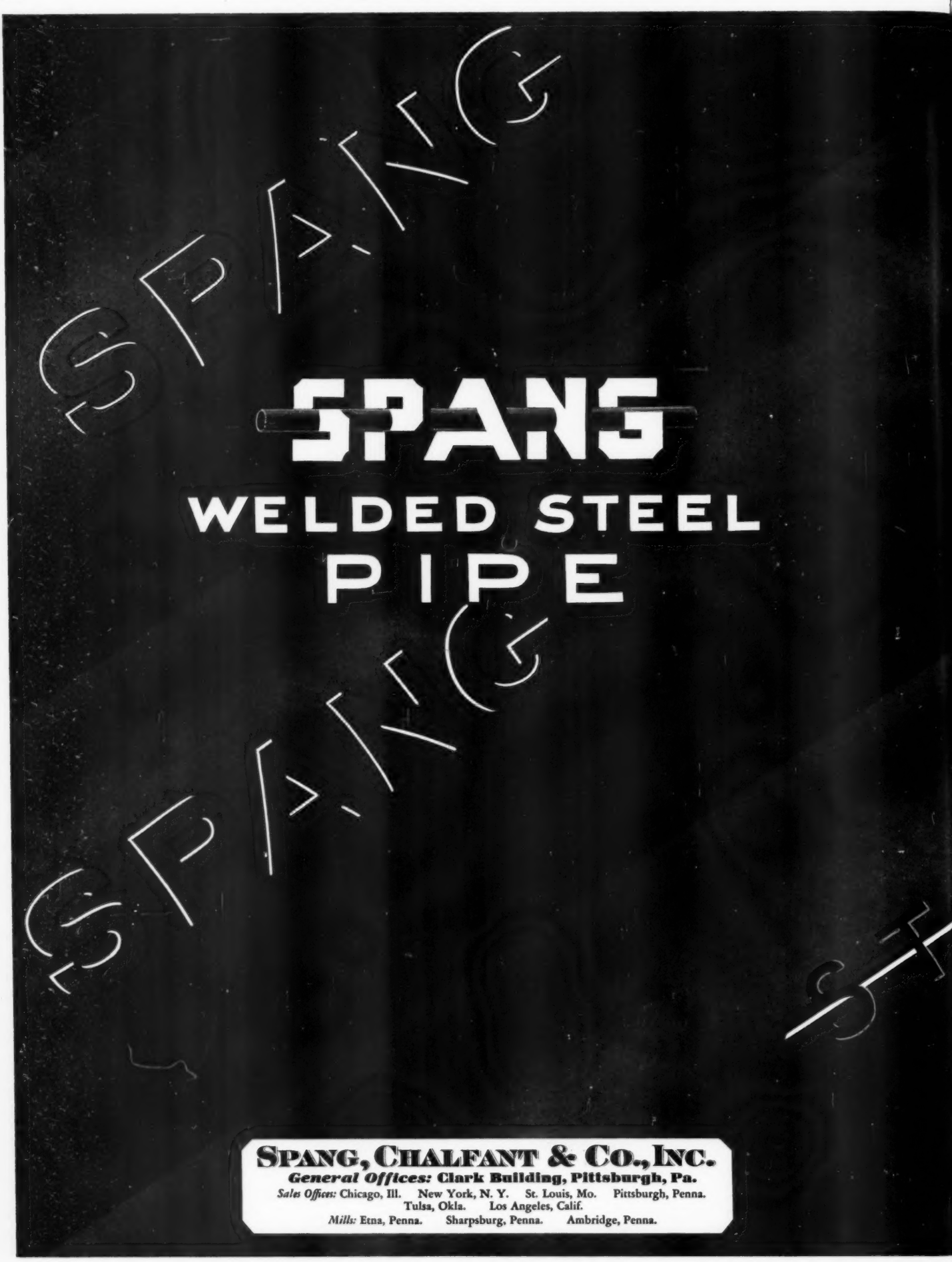
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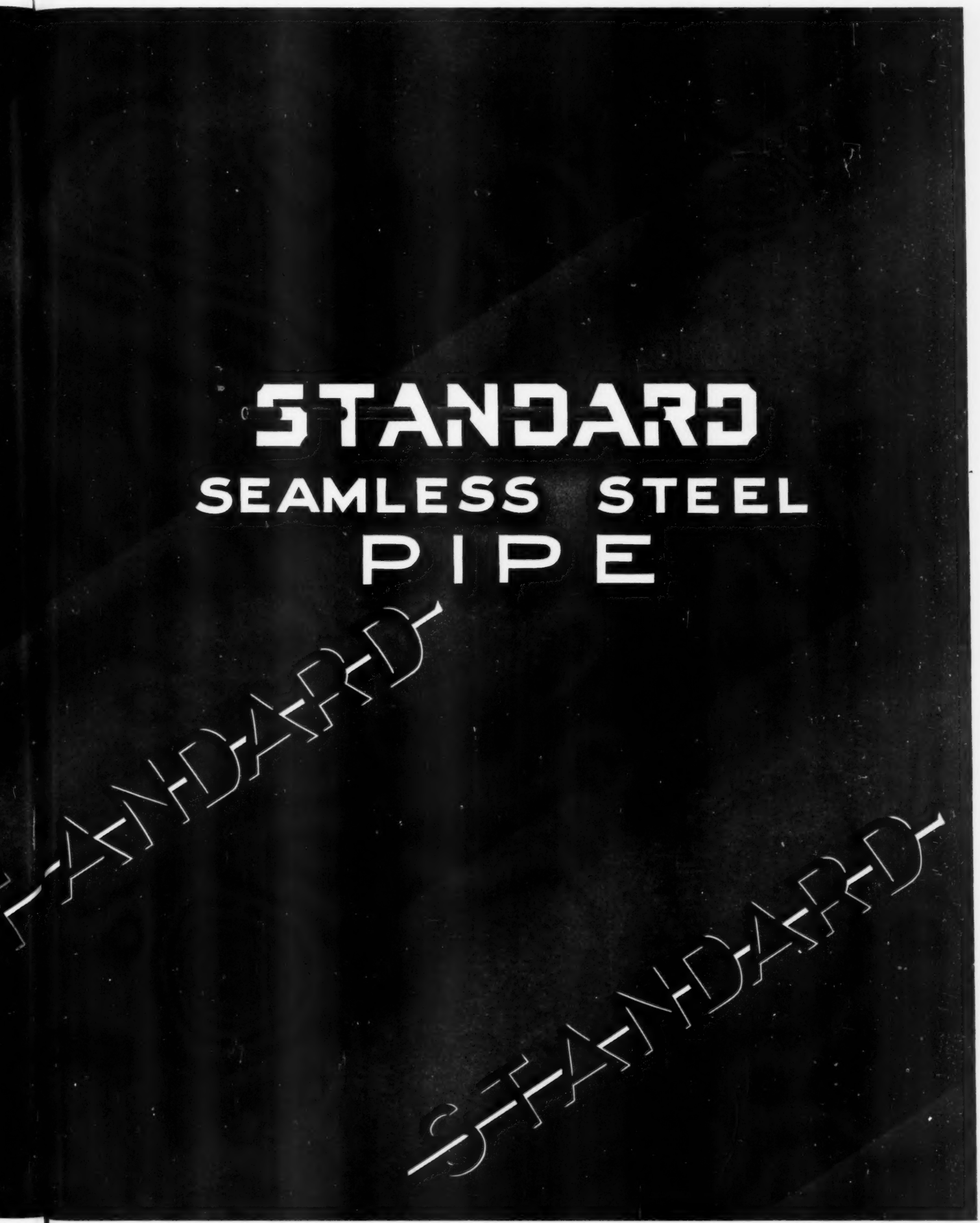
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HERCULES TUBING ANCHOR
(Fully Patented)

Designed and developed to assure absolute tubing protection. Tubing CANNOT DROP while suspended in or when being pulled from the well. Can always be controlled from top of well. Can be run in against heavy pressure, making it an ideal tool for supporting the tubing within the casing in flowing wells. Being but 24" long it is possible to run it in wells that are crooked. Wherever the HERCULES TUBING ANCHOR is used, you are INSURED 100% against Tubing accidents.

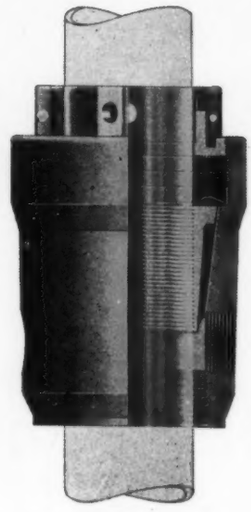
HERCULES UPSET PUMPING AND FLOWING TEE
(Patent Pending)

Designed primarily to simplify the method of connecting up wells for either pumping or for flowing by air or gas. The Tee is equipped with both upset and regular threads on the bottom for connection with the tubing. Tested for 3000 lbs. pressure. The combination thread on bottom often saves the operator time and trouble in making his well connection where upset tubing is used.

HERCULES FLOW HEAD

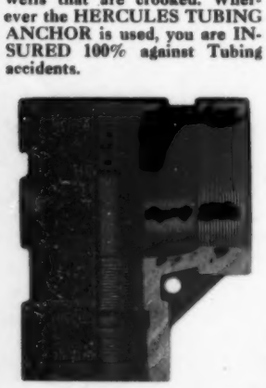
HERCULES TUBING HANGER
(Patent Pending)

Supports tubing in casing head. Being made of forged steel, all chances of leaks occasioned by sand and gas holes are eliminated. Tested for 2500 lbs. pressure. Simple in design yet complete—small in construction, but sturdy, with ample strength to support twice the weight of the longest string of tubing. Consists of body, three slips, packing ring and packing nut. Sets down in casing head out of way of the pumping equipment.



HERCULES HIGH PRESSURE FORGE STEEL CASING HEAD
(Patent Pending)

Designed and developed to form an absolute seal between two strings of casing and to support the inner string on slips as a means of safety. Tested to 3000 lbs. actual pressure and to carry a hanging weight of over 400,000 lbs. We also manufacture a Forge Steel swedge nipple to screw on top of the casing head, reducing down to the size of casing on which the casing head is made up. Each Casing Head is equipped with slips, rubber and steel packing rings and split packing nut.



HERCULES UPSET PUMPING AND FLOWING TEE

HERCULES FLOW HEAD
(Patent Pending)

Designed for use where air and gas lift is being used to flow wells. The body has a 90-degree side outlet the same size as the casing on which it is set up. On the back side is a 2" opening for connecting a pressure gauge. It has a casing head top and a packing head that screws down into a casing thread making a gas tight joint. The packing head is equipped with slips, to support the tubing, packing rings and packing nut, (same as our tubing hanger) to pack off around the tubing. Tested for 2500-lb. pressure. The simplest, yet most complete and positive device for flowing wells in use.

HERCULES TUBING HANGER

We manufacture also: Hercules Forged Steel Tubing Heads (a combination casing head and tubing support); Hercules Tubing Spiders (an automatic safety tubing spider); Hercules Casing Head Adapters; Hercules Tubing Rotators; Hercules Tubing Strippers.

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Tulsa Oklahoma

Central West Work Chiefly Wildcatting

Gas Men Also Active, With Gas Producing Territory at Premium. Hardin County Continues Busy

By George A. Whitney
Staff Correspondent, Central West Fields

FINDLAY, Ohio, Sept. 29. — Proration enforcement is not required in the Central West Field as the wells being found are only small producers at their best. Operators feel the oil is better in the ground. Most available storage has been filled. Most of the work under way in the Central West Field is on the wildcat order or for natural gas, the latter showing more activity than for oil. Gas producing territory is at a premium at this time anywhere in Ohio, Indiana, Illinois, Kentucky, Tennessee and Michigan, and there are still large areas in these states to keep the wildcatter going for years to come.

Completions are few of late in the old Lima Field of northwestern Ohio, but one new well being reported in several days, which was drilled by Barnaby and others on the John Feigelist farm, Section 29, Eden Township, Seneca County, which developed a small gas volume in the Trenton formation. The Trenton was topped at 1,595 feet and drilled 250 feet in to a total depth of 1,845 feet.

Hardin County Most Active

Hardin County, on the south side of the old developed Trenton Rock area, where wells are being drilled for gas, is the most active section at this time. The gas wells are not of large volume, but there is a ready market for the gas. There is close to a dozen drilling wells in the Kenton Field of this county, and a couple of others across the division line of Hardin and Wyandot Counties. In Pleasants Township, Hardin County, the Kemrow Co. is drilling a second test on the Treager heirs, Section 7. M. J. Lynch is drilling No. 1 Newton Marin farm, same section, and Charles Aber is drilling No. 3 on the Minnie Kahler farm, same section. Jupiter Oil Co. is drilling No. 1 George A. Matthews, 122 acres, and O. A. Huntsberger is drilling No. 1 Minnie Burnison, Section 6, same township. In Blanchard Township, Bert Sheldon is starting a test on the Oscar Schwemmer, Section 31. In Cessna Township, same county, where the Geiger Oil Co. drilled the first well of value in the new field on the Grant Geiger farm, Section 13, the property has been sold to the Wiser Oil Co., and No. 3 well is now nearing completion on the lease. In this township, Chaney and others are drilling No. 1 Frank B. Wilson farm, also No. 1 on the Frank Kreitzler farm, Section 13. J. W. O'Neil and others are drilling No. 1 Fred Wedertz farm, Section 24, Cessna Township, and Bryan and others are drilling No. 1 H. R. Ziegler, same section.

D. T. Troup of Ashland, Ohio, has this to say of the well recently drilled in by H. A. Newcomer and J. R. Gregg on the Harrison Feeley 80-acre farm, Section 5, Crane Township, Wyandot County: "This well is north of Upper Sandusky just over the line from Tymochtee Township, in Crane Township, Wyandot County, and northeast of the old Wyandot County Pool, 1 mile, and has opened up a new pool or an extension of the old pool. A geologist's report is that it runs northeast, then turns and runs north to the Tiffin Pool. There is going to be a lot of action in this part of Wyandot County. This well was drilled to a total depth of 1,407 feet, Trenton being topped at 1,361 feet and drilled 41 feet in. Fifty-eight feet of 8-inch drive pipe and 357 feet of 6⅝-inch casing."

CENTRAL OHIO

Twenty-four completions were reported from the Central Ohio area of the Central West Field, of which eight were oil wells with an initial production of 354 bbls., nine dry holes and seven gas wells, while in new work there was a nice increase, there being nine new locations made and 36 wells started spudding, a total of 45, which means that the usual activity prevails in this field.

In Ashland County, Jackson Township, Ohio Fuel Co. has a gas well in No. 1-5,222 Jess Howell farm, Section 28, and a dry hole in No. 1-5,203 G. A. Keener farm, Section 23, same township, as broken sand was found. The Kemrow Co. is drilling No. 1 Silas Weidman farm, Section 4, same township. Ohio Fuel Gas Co. reports a dry hole in No. 1-5,081 W. R. Gardner farm, Section 27, Orange Township. D'Lano and others are drilling No. 2 Melvin Devault, Section 29, Perry Township, and Coast and others are drilling No. 10 Edward Barnhart farm, same section. Robinson and others' No. 1 Elza Sheriff farm, Section 18, Vermillion Township, was dry from 606 to 644 feet.

In Medina County, Harrisville Township, the Ohio Fuel Gas Co. has a gas well in No. 1-5,268 Daniel Long farm, Lots 29 and 30. Oko Oil & Gas Co.'s No. 41 Henry Essig, Lot 13, Chatham Township, produced 10 bbls. at 385 feet.

In Lorain County, Carlisle Township, the Ohio Fuel Gas Co. got a gas well in No. 1-5,271 L. H. Bruce farm, Lots 15 and 16, and the Wiser Oil Co.'s No. 1 Thomas A. Conway farm, Lot 6, same township, produced around 500,000 feet from 2,405-10 feet. Steele & Tubes Co. made a location on the F. E. Schwartz farm, Lot 14, same township. In Ridgeville Township, L. F. McGrath made a location for No. 1 Otto Jarmush farm, Lot 31, and the Lorain Oil & Gas Co. made a location on the Jacob Sorger farm, Lot 41, same township.

Wayne County

In Wayne County, Congress Township, Short and others are drilling No. 3 Anna Younker farm, Section 14. In Chester Township, Ohio Fuel Gas Co.'s No. 1-5,238 A. E. McAfee farm, Section 24, was dry in the Clinton lime formation.

In Holmes County, Hardy Township, East Ohio Gas Co.'s No. 6 S. H. Sterling farm, Section 26, produced 11 bbls. initial from a depth of 3,476 feet. In Monroe County, Ohio Fuel Gas Co.'s No. 2-5,250 Valentine Close farm, Lots 13-18, was dry in the Clinton formation. Ohio Fuel Gas Co. struck a good gas producer in No. 1-5,245 J. L. Phillips farm, Lot 10, Richland Township.

In Ashtabula County, Sheffield Township, Ohio Fuel Gas Co.'s No. 1-5,221 John Dunnick farm, Lot 28, was dry at 3,075 feet.

In Knox County, Clay Township, Poorman and others abandoned a dry hole on the Isaac Miller farm, Section 5. The Preston Oil Co.'s No. 2-1,435 Emanuel Rine farm is rated with an initial of 80 bbls. from 3,065-68 feet. Upham Gas Co.'s No. 1 Jesse White, Section 23, Union Township, was dry from 2,530-36 feet. Same company is drilling No. 3 George Shire farm, Section 9, Brown Township. Bell Brothers are drilling No. 2 C. H. Sheldon, Section 11, Jefferson Township.

In Summitt County, Franklin Township, East Ohio Gas Co. is drilling No. 2 N. C. Slater, Section 25. Kime and others are drilling No. 1 Thomas Vaugh, Section 2, Coventry Township, same County. Eagon and others found No. 3 Sam Herring farm, Section 17, Green Township, same county, a failure in the Newberg sand. Smith and others are drilling No. 1 Smith farm, Section 19, Green Township.

In Licking County, Fallsburg Township, Ohio Fuel Gas Co.'s No. 1-5,241 Howard Ashcraft, Section 11, had a slight showing of oil at from 2,935-76 feet, but is reported dry. I. C. Robinson's No. 1 C. H. Kidd farm, Section 5, same township, produced 10 bbls. initial from 2,944-70 feet. Emerald Petroleum Co. is drilling on the Allen Johnson farm, Section 13, same township. Settles Oil Co.'s No. 1 David Wright farm, Section 3, Mary Ann Township, produced 16 bbls. the first 24 hours from 580 to 588 feet. Ralph Brothers are drilling a second test on the James B. Colville, Section 9, Eden Township, same county.

Muskingum County

In Muskingum County, Jackson Township, the Pure Oil Co.'s No. 3 on the Otis McKee farm, Section 6, produced an initial of 224 bbls. from 2,977-3,025 feet. Wittmer Properties, trustee, is drilling No. 1 Carl W. Riley, Section 11, Perry Township, and No. 1 Frank Border, Section 15, same township. Fetty & Loucbary made a location on the John Hawthron farm, Section 21, Monroe Township.

In Athens County, Ames Township, the Ohio Fuel Gas Co. has a gas well in No. 3-5,283 G. L. Fleming farm, Section 4, in the lower Berea sand at 1,445 feet. Same company has a gas well in No. 1-5,298 John R. Ruth farm, fractional Section 18, Lodi Township, in the second Cow Run sand at 666 feet. Whitmer and others are starting a test on the Henry B. Schall, Section 24, York Township.

In Tuscarawas County, Oxford Township, a light gas well was drilled by the Ohio Fuel Gas Co. in No. 1-5,198 Howard Hart farm, Section 21, at 3,615 feet. Wehrle Co. is drilling No. 1 C. C. Rector, Section 17, same township.

In Stark County, Lake Township, East Ohio Gas Co. has a light gas well on the Harry Alexander farm, Section 32, at 4,558 feet, while Kime and others drilled in a fair gas well in No. 1 on the Brookside Country Club grounds, Section 2, Perry Township. East Ohio Gas Co. is drilling No. 1 Henry C. Rudy farm, Section 6, Jackson Township.

In Belmont County, Somerset Township, M. Fulton and others' No. 1 John F. Skinner farm, Section 1, is reported good for 3 bbls. initial at from 1,347 to 1,357 feet. A. C. Peters and others are drilling No. 1 W. L. Wheatley farm, Section 26, same township.

In Guernsey County, the Hopewell Oil & Gas Co. made a location for No. 3 on the F. L. Euga farm, Section 8, Wheeling Township.

INDIANA

In the Indiana fields the outlook is bright for much test work in the near future as oil men are scouring the State for gas as well as oil, and much leasing is being done in wildcat areas which will be tested to some extent during the win-

(Continued on Page 414)

TWO FAIR PRODUCERS IN KENTUCKY; SEVERAL FAIR GAS WELLS COMPLETED

By George A. Whitney

OWENSBORO, Ky., Sept. 29.—The shutdown in the Owensboro Field in Ohio, Daviess and Hancock Counties, and in fact the entire State still prevails, but the hunt for natural gas still keeps going along, also more or less wildcat work. Only a few scattered wells were reported for the week, two of them above the average.

Ohio County Wells

James C. Ellis and others are credited with two good producers; No. 7 on the Cody Hoover lease in the Taffey area, said to be good for 100 bbls. initial, and No. 7 on the Bud Hoagland No. 2 farm, in the same area, also 100 bbls.

Brenner & Adams drilled in No. 3 on the O. F. Bellamy farm of 20 acres, that pumped 10 bbls. the first 24 hours.

Wood Oil Co.'s second test on the Burdette heirs farm, is said to have showed 1,000,000 feet of gas, while Hall and Garrison's No. 1 S. E. Russell farm, measured 300,000 feet. Pointer and others' No. 1 W. Henry Lyons farm, gauged 138,000 feet of gas.

The Ohio Oil Co.'s test on the John Purcell farm is reported good for 5 bbls. initial in the Jett sand, and the Cumberland Petroleum Co.'s No. 2 Alfred Brown farm, was a dry hole.

Hartford Development Co.'s No. 3 J. A. Westerfield farm, in the Dundee area of the county, pumped 6 bbls. initially.

T. P. Royal and others are drilling No. 17 T. P. Royal 60 acres, in the Friendship Church area. P. A. Rowe and others are drilling No. 6 on the T. P. Royal 25 acres, same area. D. J. White and others are drilling No. 1 on the Herbert McCoy 120 acres, adjoining the Dave Brooks farm, in the Haynesville area.

Other Completions

In the Maxwell Pool, in Daviess County, the Leeper Oil Co. and others' second test on the J. L. Bennett farm, is said to be a dry hole. The Ohio Oil Co.'s No. 5 on the B. L. Johnson 128 acres, is in but no report as to its value as a producer.

In the Pellville Pool, of Hancock County, the Chester Oil Co.'s test on the William Bates farm is reported with a gas volume of 2,000,000 feet from the Barlow sand. D. T. Bolling's second test on the Lewis Richards farm, is reported dry in both the Jett and Barlow sands No. 1 in the center of this same farm of 160 acres, was a fair sized oil producer.

In the Niagara Field of Henderson County, the Clark Hill Drilling Co.'s No. 3 Walker Basket farm is reported at 5 bbls., while Washman & King's No. 1 Latta & Yeaman farm, same pool, was a duster.

Field Pickups

Vickers and others are drilling on the Rachael Schultz farm, east of the Burton Pool, in Daviess County.

Carl Wiedeman, Cleveland, Ohio, has been looking over the holdings of the Cumberland Petroleum Co. and Wiedman Oil Co. in the Tri-County Field.

Rodes & Swarthout have taken a contract for the drilling of five wells in the Owensboro Field for the Ohio-Osage Oil Co., of Oklahoma.

Heretofore the drilling done in Caldwell County has been of the shallow kind, but the county is so well located for both oil and gas, that the J. B. Alford Co., of Dallas, Tex., is arranging to drill for deeper pay sands. The first test will no doubt be drilled in the Farmersville Dome district of the county, where the company will drill a number of tests.

Royalties didn't come into the oil industry with cracking Oil men have paid royalties ever since there were oil wells But when did royalties ever bring such returns as they give Dubbs licensees?

It costs the producer an eighth or a sixth — sometimes even a fourth in royalties — just for the right to take the oil out of the ground, after risking his entire investment

What a refiner pays for use of the Dubbs process is trifling in comparison and no risk to his investment

Universal Oil Products Company's staff of technologists knows how to apply science to the dollars and cents problems of the refiner They are at the service of every Dubbs licensee

In the last analysis their real job is to help Dubbs licensees make money

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

Probable Visitors at the Petroleum Exposition

1—Top row, left to right: Roy Scott, E. E. Hale, W. H. Walker, J. I. French, and D. F. Luse. Bottom row: Carl Yarbrough, A. H. Sandell, C. L. Rowan, J. Vance, and E. R. McPhaul, Rowan Drilling Co. 2—W. B. Hamilton, Louisiana Land & Exploration Co.; and R. R. Hooks, superintendent, The Texas Company, Terrebonne Parish, Louisiana. 3—Neal Madelin and G. M. Johnson, Pure Oil Pipe Line Co., Dallas, Tex. 4—L. D. Wristen, Continental Oil Co. 5—Oil scouts in Wichita Falls, Texas, district: M. M. Bates, Humble Oil & Refining Co.; P. M. Buchanan, Shell Petroleum Corp.; W. T. Flournoy, Empire Gas & Fuel Co.; Everette Meaders, Sinclair Crude Oil Purchasing Co.; E. F. Stephens, Arkansas Fuel Oil Co.; James Maxwell, Continental Oil Co.; Joe Austin, Deep Oil Development Co.; C. E. Parker, Gulf Production Co. Kneeling, left to right: C. E. Moss, The Texas Company; Roy Brown, Arkansas Fuel Oil Co.; Ottis Haynie, Prairie Oil & Gas Co.; Guy Sinclair, Gulf Production Co.; and Billy Maloney, Gulf Production Co. 6—G. R. Hill, independent operator, Fort Worth, Tex., and L. E. Barrows, division manager, The Texas Company, Fort Worth. 7—S. L. Carter, tool dresser; and Fred Campbell, driller, Coleman, Tex. 8—George Calvert and J. A. Deering, oil operators. 9—Harry Baker, E. J. Meade, and L. Bunch, Oklahoma Natural Gas Corp.; and Carlton Meredith, independent operator, Coleman, Tex. 10—R. B. Gray, Lone Star Gas Co., Coleman, Tex.

Andrews County Wildcat Showing Oil

Fuhrman Test Has 3,500 Feet of Oil in Hole. Possible Discovery of Another Pool. Ward County's Largest Well

By L. E. Bredberg
Fort Worth Bureau, The Oil and Gas Journal

FORT WORTH, Tex., Sept. 29.—While backers of state-wide proration are energetically supporting it, and others are assuming an antagonistic attitude, companies and independents continue to drill and bring in more producers which are immediately put on proration tables and given their percentage allowance along with the rest of the producers in their respective fields, or if they are wildcats, are shut down until storage can be erected and the owners barter for a pipe line connection.

Another wildcat in the Permian Basin, one which has attracted much attention heretofore because of its striking 26,000,000 feet of gas, is now looming up as another possible discovery well, opening another pool which will give the authorities more proration problems to solve, unless a pipe line connection cannot be obtained. Possibly the owners will run their own pipe line to a loading rack and ship their oil by way of tank car, but three other wildcat discoveries within several miles of this discovery are still running oil to storage, and the first one, the Deep Rock Oil Co.'s No. 1 King, in central Andrews County, has been producing for about a year. Southern Crude Oil Purchasing Co.'s discovery on the Cowden ranch, to the south in Ector County, has been producing but a few weeks, but no pipe line has been announced to serve it, therefore Fuhrman Petroleum Co.'s No. 1 Ford in Section 16, Block A-46, Public School Lands in southern Andrews County, may look a long time for a pipe line connection even though it makes a good well, and opens a new pool.

Has 3,500 Feet of Oil

The afternoon of September 29 this well was drilling ahead at 4,340 feet with 3,500 feet of fluid in the hole of which about 300 feet is drilling water and mud and the remainder oil. The first showing of oil was logged at 4,262 feet and at 4,287-96 feet in a porous saturated lime it had an increase, the oil rising 3,500 feet in the hole in the first 16 hours.

This test is 6 miles south of the Deep Rock Oil Co.'s small producers, and approximately 16 miles northwest of Southern Crude Oil Purchasing Co.'s No. 1 Cowden, in Section 26, Block 43, Township 1n, T.&P. Survey, Ector County, which was completed a few weeks ago at a total depth of 4,244 feet for an initial production of 256 bbls. It is in absolute wildcat territory, and about 19 miles northeast of the Penn Pool in the same county.

The Fuhrman test has not yet proved itself a commercial producer, and is now 1,150 feet below sea level, making it appear as drilling in dangerous ground with water relatively near, and at this depth a producer would have to be of long duration or a large producer in order to pay costs of drilling and producing it. The well is farther in the lime than the Southern Crude producer to the south, but is running higher on structure, many believing that a saddle exists between the two wells.

One mile south of the test, Block 9 of University School Lands remains unleased, 48 sections, several of which will be sure of production if the Fuhrman test makes a commercial producer. However, many companies recently voiced opposition to the University Lease Board leasing this land at this time when many are working to make a success of state-wide proration, stating that such leasing would not aid in the work, but would work to retard it.

Ward County's Largest

Ward County's largest producer was completed this week on the Edwards and O'Brien block of the Gulf Production Co. This well is No. 13, located 330 feet from the south and 2,315 feet from the west of Section 6, Block F, G.M.M. B.&A. Survey. It logged top of the pay at 2,578 feet and encountered an increase at 2,595-2,600 feet, flowing 500 bbls. the first five hours with an estimated 2,500,000 feet of gas. Elevation of the test is 2,656 feet.

West Texas showed another decrease in production this week, falling off 5,111 bbls. from 272,117 bbls. to 267,006 bbls.

Sinclair Oil & Gas Co.'s No. 1 Dodge estate is now shut down at 2,798 feet after deepening. It was shot with 300 quarts from 2,640-2,798 feet, and is swabbing, looking good for a 250-bbl. well. This well is on the eastern side of Howard County, about 3 miles west of production on the extreme western side of Mitchell County, and is the nucleus of another small pool in this part of Howard.

Proration Changes

Proration of the Howard-Glasscock County pools is to stand as it has been carried, but the Col-Tex Refining Co. which asked for an additional daily allowance of sweet oil to keep its refinery running to capacity is to gain about 2,500 bbls. additional per day from wells to which the Humble Pipe Line Co. has been connected. This allowance is to be granted for an indefinite period due to the fact that the Col-Tex refinery at Colorado City is not equipped to handle the sulphur crude of West Texas, but does need more sweet oil to fill its contracts.

Crane-Upton proration is to remain the same, a daily allowance of 29,000 bbls.

The Ector County Advisory Committee met at Fort Worth, September 29, and recommended a change in proration of the Penn Pool to a basis similar to the Yates Field plan, that is, 25 per cent for acreage and 75 per cent for average potential. This plan was advocated by a few producers in the pool at the first proration meeting held to discuss prorating the Penn Pool, but was changed to 150 bbls. per well minimum basis. The total potential of the pool is now 33,307 bbls. and allowance is figured on total market outlet of 8,500 bbls. daily.

R. R. Penn, chairman of the statewide curtailment committee, sent a wire to D. J. Moran, president of the Continental Oil Co., Ponca City, Okla., and Levi Smith, president of the Big Lake Oil Co., on September 29, asking for co-operation in the proration movement through curtailment of production in the Big Lake Field, Reagan County.

COMPLETIONS IN WEST TEXAS

Ector County

Texas Pacific Coal & Oil Co.'s No. 1 McKenzie, temporarily abandoned, total depth 3,870 feet. Independent Oil & Gas Co.'s No. 1 Eidson, temporarily abandoned, total depth 3,800 feet.

Howard County

Magnolia Petroleum Co.'s No. 1 Kelly Chalk, top pay 2,885 feet, initial production 98 bbls. oil and 4 bbls. of water on pump, total depth 2,990 feet. Pure Oil Co.'s No. 2-A Scrivner, top pay 2,480 feet, initial production 94 bbls. fluid and 5 per cent water, total depth 2,510 feet.

Loving County

Joe Rush and others' No. 1 Jim Wheat, top pay 4,305 feet, shot 180 quarts from 4,271-4,306 feet, initial production 567 bbls. after shot, total depth 4,30C feet.

Pecos County

Cardinal Oil Co.'s No. 2 Tippett (Sun Oil Co), dry and abandoned, total depth 445 feet.

Reeves County

Salsberry and Gregory's No. 1 Young Bell, temporarily abandoned, total depth 370 feet.

Taylor County

Eastland Oil Co. and others' No. 1 Hunter, total depth 2,407 feet, plugged back to 2,385 feet, top pay 2,380 feet, initial production 60 bbls. oil and 8 bbls. of water.

Crane County

Gulf Production Co.'s No. 3-B McElroy, top pay 2,885 feet, initial production 150 bbls., shot 290 quarts from 2,885-3,005 feet, total depth 3,011 feet.

WEST TEXAS PRODUCTION

Week Ended September 27

County—	No. wells	Bbls.
Andrews	2	10
Crane	367	25,631
Crockett	49	1,736
Ector	70	10,306
Fisher	8	1,931
Garza	..	None
Howard-Glasscock	526	22,731
Irion	7	150
Jones	73	1,364
Loving	26	1,781
Mitchell	148	2,150
Pecos	499	105,440
Reagan	253	22,291
Runnells	3	13
Scurry	5	10
Taylor	3	75
Upton	251	7,417
Ward	40	3,568
Winkler	593	61,493
Total production this week		267,006
Total production last week		272,117
Decrease		5,111

RUNS THROUGH TRUNK LINES

Company, size, location—	Bbls.
Atlantic, 10", Houston	21,324
Gulf, 10", Ranger	38,184
Humble, 2-8", San Angelo	39,651
Humble, 10" and 12", Station "A"	43,560
Illinois, 2-8", Del Rio	26,629
Magnolia, 8", De Leon	26,303
Pasotex, 8", El Paso	13,274
Shell, 10", Healdton	35,496
Shell, 10", Houston	27,231
Texas, 12", Houston	15,612
Total	287,234

RUNS TO WEST TEXAS REFINERIES

	Bbls.
Amarillo Refg. Co., Pyote	None
Big Spring Refg. Co., Big Spring	953
Burford Refg. Co., Pecos	3,726
Blue Bonnet Refg. Co., Wickett	None
Cosden Refg. Co., Big Spring	7,013
Col-Tex Refg. Co., Colorado	6,500
Great Western Refg. Co., Big Spring	2,413
Humble Oil & Refg. Co., McCamey	12,626
Richardson Refg. Co., Big Spring	1,267
Tonkawa Refg. Co., Pyote	1,365
Wickett Refg. Co., Wickett	140
Total	36,013

TANK CAR SHIPMENTS

	Bbls.
T. P. C. & O. Co., from Hurdle	814
Fox & Thorsen, from Mertzon	148
Thomas-Brann, from Frant City	300
Reagan Co. Pur. Co., from Texon	None
Orient, from Hurdle	25
S. C. O. Pur. Co., from Wickett	16,424
Total	17,711
Total daily average distribution	340,958
Total daily average production (including Lea County, N. Mex.)	312,630
Daily average from storage	28,328

WILDCAT OPERATIONS IN WEST TEXAS

Week Ended September 29

ANDREWS COUNTY

Company, well, farm name, section and location—	Remarks—
Deep Rock Oil Co. et al's No. 1 Mathis, 900 ft. from S and W, Sec. 4, Blk. A-46, Public School Land	Flowing 10 bbls. per day; total depth 5,088 ft.
Deep Rock Oil Co.'s No. 1 Miles, 900 ft. S, 1,650 ft. E of NW cor., Sec. 22, Blk. A-46, Public School Land	Shut down 4,765 ft.; 2 bbls. sulphur water per hour.
Fuhrman Pet. Corp.'s No. 1 Ford, 440 ft. from S and 2,200 ft. from W of Sec. 16, Blk. A-43, Public School Land	Shut down 4,301 ft.; 3,000 ft. oil in hole.
Deep Rock Oil Co. et al's No. 1 King, 330 ft. from N and 2,310 ft. from E, Sec. 11, Blk. A-46	Top pay 4,335 ft.; flows every 4 days; temporarily abandoned; total depth 4,454 ft.
Maer & Staniforth's No. 1 Meador, C SW Sec. 8, Blk. A-41	Shut down 4,501 ft.

BREWSTER COUNTY

Brewster Oil Co.'s No. 1 fee, 2,640 ft. S and 2,598 ft. E of NW cor. Sec. 45, Blk. G-15, G.C.&S.F. Sur.	Shut down 1,935 ft.
E. L. Chapman's No. 1 Skinner, C SW SE Sec. 100, Blk. 2, G.C.&S.F. Sur.	Shut down 1,302 ft.
Trans-Pecos Oil & Gas Co.'s No. 1 Jones, 920 ft. from N and 2,500 ft. from E of Sec. 18, Blk. G-15, G.C.& S.F. Sur.	Shut down 2,510 ft.
Van McPhail"s No. 1 McIntyre, SE cor. Sec. 59, Blk. 352, 7 mi. S of Alpine	Shut down 1,750 ft.

COKE COUNTY

Arkansas Fuel Oil Co."s No. 1 Stepp, 1,020 ft. NE, 2,340 ft. W of SE cor. Sec. 35, Blk. 1-A, H.&T.C. Sur.	Shut down 4,565 ft.

CONCHO COUNTY

Beesley et al's No. 1 S. Waring Est., 1,320 ft. from S and E of A. T. Robinson Sur., Abst. 2,120	Spudded and shut down.
Turner et al's No. 1 Borsig, 150 ft. from S of NE cor. G. Emmig Sur. 120, 6 mi. W of Paint Rock	Shut down 1,720 ft.

CRANE COUNTY

Cranfill Bros. and Gulf's No. 1 J. B. Tudd, 2,310 ft. from N and 330 ft. from E of Sec. 3, Blk. B-37, Public School Land	Underreaming 4,135 ft.
Cranfill Bros.' No. 1 Muir, 330 ft. from N and 2,310 ft. from W, Sec. 23, Blk. B-27, Public School Land	Shut down 1,775 ft.
C. C. Duffey's No. 1-C Cowden Bros. & Co., 2,640 ft. from S and 3,960 ft. from W of Juan Cordona Sur.	Drlg. 3,785 ft.

CROCKETT COUNTY

Dixie Oil Co. and Amerada's No. 2 Powell, 258 ft. N and 2,349 ft. W of NE cor. of Sec. 42, T.C. Sur., but located in Sec. 52, Blk. BB	Underreaming 2,415 ft.
Doleman & Moore's No. 1 Perner, 3,135 ft. from N and 1,485 ft. from E of Sec. 36, Blk. 2, I.&G.N. Sur.	Spudded and shut down.
Magnolia Pet. Co.'s No. 2 Hoover, 2,310 ft. from S and 335 ft. from E of Sec. 2, Blk. FF, B.&B. Sur.	Drlg. 2,053 ft.; show oil 2,038-50 ft.; bailed ½-bbl. oil over night.

CULBERSON COUNTY

Grisham & Hunter's No. 2 Garren, 2,475 ft. from S and 1,566 ft. from E, Sec. 20, Blk. 89, Public School Land	Shut down 1,520 ft.; show oil 1,400-15 ft.
Kornrumpf et al's No. 1 Garren, 330 ft. S and W, Sec. 15, Blk. 79, Public School Land	Shut down 983 ft.

(Continued on Page 324)

Effect of Proration on Panhandle Wells

David Donoghue Reports After Visit to Amarillo and Pampa Districts. Danciger Company Obtains Temporary Injunction

By L. E. Bredberg
Fort Worth Bureau, The Oil and Gas Journal

FORT WORTH, Tex., Sept. 29.—Proration controversies continue in the Panhandle, and during the past week a new move was made which may affect the industry all over the State. This move was made by the Danciger Oil & Refining Co. which obtained an injunction against proration in the Panhandle district, allowing the company to produce its wells wide open on all its leases, and other independent operators are about to follow suit in this movement for it is argued that many leases and wells and operators in this district are being discriminated against, although they have tried to co-operate in proration.

The Humble Oil & Refining Co. cut its purchases in the Panhandle district from 14,000 to 12,000 bbls. per day, Prairie Oil & Gas Co. cut its runs to 9,200 bbls. from 11,000 bbls. per day. The last half of September the outlet was placed at 70,000 bbls. per day.

David Donoghue's Report

A letter from David Donoghue, technical advisor of the state-wide curtailment committee to R. R. Penn, chairman of the committee, dealing with conditions in the Panhandle district, follows:

"Dear Sir:

"At the request of Joseph Danciger, of the Danciger Oil & Refining Co. and J. N. Clark, chairman of the Panhandle proration committee, I spent most of last week at Amarillo and Pampa making an investigation of conditions in order to arrive at some conclusion as to whether or not proration would permanently impair producing properties in the granite wash areas of the Panhandle district.

"Commercial oil production in the Panhandle is found at the present time along the north flank of a buried granite ridge running southeasterly through Moore, Carson, Hutchinson, Gray and Wheeler Counties. The oil producing horizons are dolomite, lime and granite wash, found between sea level and 200 feet above sea level. The dolomite is the principal producing horizon in Hutchinson County, and the granite wash in Gray County. The granite wash is usually overlaid by, and sometimes intimately mixed with, a reddish clay which is also a product of the weathering of the granite. This material caves easily and causes much trouble in the completion of and producing of wells.

"In the granite wash, the original rock pressure was about 210 pounds per square inch. In the producing areas this pressure has now dropped to around 30 or 40 pounds per square inch. There are some natural flowing wells and wells pumped on beam and on jack, but a large part of the production is obtained with gas lift.

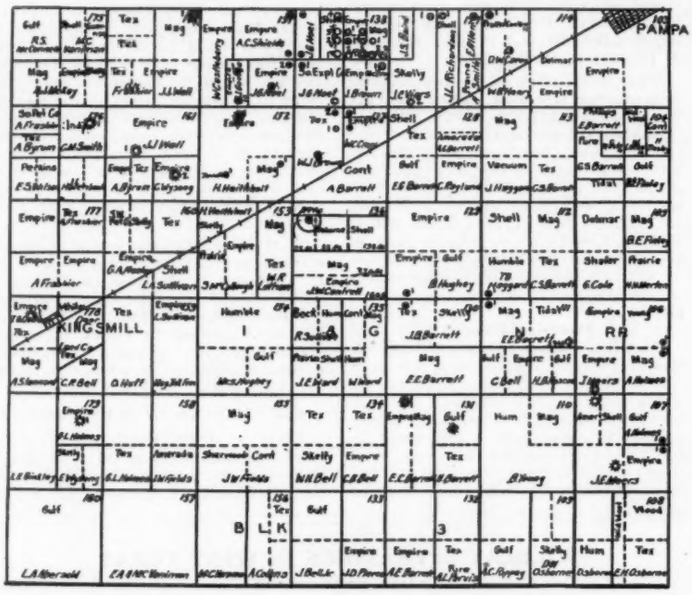
"With gas lift, input gas usually has a pressure of 75 to 100 pounds, with no pressure on the separator. To effect a reduction in production, pressures of as high as 25 to 30 pounds are placed on the separator. This builds up the pressure of the input gas and causes a higher pressure on the sand face. Too much pressure will cause the well to cease producing temporarily. Natural flowing wells, of course, will likewise be affected due to the small pressure in the sand.

"Apparently there is no trouble anticipated from wells on the beam or jack or from wells in the lime and dolomite areas.

Specific Cases

"Three cases were specifically called to my attention where it was claimed that permanent impairment would result if the wells were closed in.

"The Danciger Oil & Refining Co.'s No. 1 Cheatham in Section 28, Block Y, Hutchinson County, Texas, was producing 415½ bbls. on August 1, and it gradually decreased to 338½ bbls. by September 1, when it was cleaned out and it then made 395 bbls. During the above period the well was flowed with 60 to 65 pounds input pressure with no pressure on the separator. From September 4 to 11, the well was under proration with 70 pounds pressure on the gas line and 4 to 10 pounds on the separator, and it averaged 203 bbls. a day with a minimum of 173 bbls. and a maximum of 234 bbls. On September 11 the well was opened up for a test with 50 to 55 pounds input pressure and from 0 to 3 pounds on the separator, and its maximum production during the next five days was 239½ bbls. The normal decline of this well during the month of August was about 2½ bbls. per day. If this decline had been allowed to continue, without cleaning out and without back pressure, the well would have been making about 300 bbls. on September 16 instead of 239½ bbls. For the first half of September the potential of this well was figured at 300 bbls. with an allowable production of 198 bbls. For the last half of September the potential was 232 bbls., with an allowable of 110 bbls. There is no doubt that this well has been harmed to some extent by being put under proration, but it is only fair to say that it is located in the extreme western part of the Panhandle producing area, 35 miles from the Gray County production with which it is compared. I do not know what has been done to bring this well back other than to run the tools into the hole and agitate the well a couple of times a day.



Plat showing location of most interesting semiwildcat discovery in the Panhandle district. Graham, Cree and Hoover are the owners of this granite wash well on the Sullivan ranch in Section 136, Block 3, I.&G.N. Survey. Top of pay was logged at 2,990 feet and the well flowed 2,400 bbls. of oil the first 12 hours with 59,000,000 feet of gas. Smaller oil wells and gassers are located in the surrounding area, but none of them can compare with this new well.

Proration Not Determined

"The Phillips Petroleum Co.'s Joe-Dan lease in the N half NE, Section 88, Gray County, was producing from seven wells on July 3, 2,921 bbls., and this slowly declined to 2,601 bbls. on August 7. One well was deepened and the rest cleaned out and on August 21 the lease produced 4,765 bbls., and on August 28 it produced 4,063 bbls. Beginning September 1, proration was put into effect on this lease, with a potential of 4,765 bbls. and an allowable of 3,059 bbls. The lease averaged within a few barrels of its allowable during the first half of the month. A back pressure of 6 to 30 pounds was maintained on these wells until September 5, after which date the wells were produced wide open. It is claimed that the production could not be increased. The production for September 15 was 2,939 bbls.; and on September 16, 2,979 bbls. Here is a case where it appears to me that the natural decline to September 1, judging by the decline in July, would have brought the lease to a production of 2,300 bbls. per day. Anticipating proration, cleaning out and deepening brought the production up to 4,765 bbls. and the lease is now doing approximately 3,000 bbls. It is difficult for me to see how the lease has been badly damaged. The deepening and cleaning out of wells never has more than a temporary effect on production, and there is no reason in this case to assume that the lease would have done any better had proration not entered into the matter.

"The Phillips Petroleum Co.'s Palmer lease, Section 31, Block B-2, Gray County, on July 3 produced from 8 wells 1,568 bbls., and declined to September 1 to 704 bbls. During the first half of September it averaged about 560 bbls. per day with a potential of 769 bbls. and an allowable of 558 bbls. This lease was back pressured from 6 to 8 pounds, and like the Joe-Dan was opened up on September 5 for a test, without any resulting increase. Considering the rather rapid decline of this lease, it does not appear that any permanent injury has been done.

"As far as I know, nothing has been done to increase production on either the Joe-Dan or Palmer lease, except to release the back pressure.

"The Prairie Oil & Gas Co. shuts down all of its wells, except natural flowing wells, on Sundays and reports no harmful effects, even with offsets operating continuously.

"In the Panhandle, proration was in effect from last November to February and leases were cut 50 per cent of their potential. No leases are reported to have been harmed to any extent. In fact one large company's representative is said to have stated at a meeting of producers that its properties had been benefited.

Conclusions

"Proration undoubtedly will permanently impair a few wells in the granite wash area, and for that matter, in any other area. The low gas pressure in the producing horizon makes it difficult to apply back pressure in sufficient amounts to affect natural flowing wells or to gas lift wells and not cause the wells to stop producing temporarily. The use of the gas lift is justified in the Panhandle on account of the large investment in casing-head plants. Operators in the Panhandle generally agree that wells on the beam or jack can be prorated with little difficulty. In general, it might be stated that no lease will be greatly harmed under proration in the granite wash areas if adjoining leases are produced on an equal basis.

Very truly,
DAVID DONOGHUE,
Technical Advisor."

Danciger's Argument

Mr. Danciger, in remarking on proration in the Panhandle, stated that offset companies owned pipe lines of their own and produced all of their oil while he and other operators were forced to find any market that they could, and

(Continued on Page 320)

WILDCAT OPERATIONS IN TEXAS PANHANDLE

Week Ending September 29

CARSON COUNTY

Company, well, farm name, section and block— Remarks—

Empire G. & F. Co.'s No. 1 Simms, 2,310 ft. N, 990 ft. E, N½, Sec. 12, Blk. 7, I.&G.N. Sur. ..... Building rig.

Empire G. & F. Co.'s No. 1 McConnell, C 8½ SW, Sec. 66, Blk. 4, I.&G.N. Sur. ..... Drlg. 1,640 ft.

North American Oil Co.'s No. 1 Burnett, C NW, Sec. 97, Blk. 4, I.&G.N. Sur. ..... S.D. 2,445 ft.

North American Oil Co.'s No. 1 Burnett, C SE, Sec. 98, Blk. 4, I.&G.N. Sur. ..... S.D. 1,840 ft.

Reiger & Steckoll's No. 1 Martin, 330 ft. N and W, SW, Sec. 90, Blk. 7, I.&G.N. Sur. ..... 12,000,000 ft. gas 2,815-2,910 ft; S.D. 3,560 ft.

Shamrock O. & G. Co.'s No. 1 Duncan, 330 ft. S and W, NE, Sec. 5, Blk. 7, I.&G.N. Sur. ..... Drlg. 2,955 ft.

Sweeney et al's No. 1 Locke, 164 ft. N and W 40-ac. tr. along R.R. in Sec. 57, Blk. 7, I.&G.N. Sur. ..... S.D. 1,000 ft.

CHILDRESS COUNTY

C. L. Sloane et al's No. 1 B. P. Smith, Sec. 49, F. P. Knott lands ..... T.D. 5,000 ft.

COLLINGSWORTH COUNTY

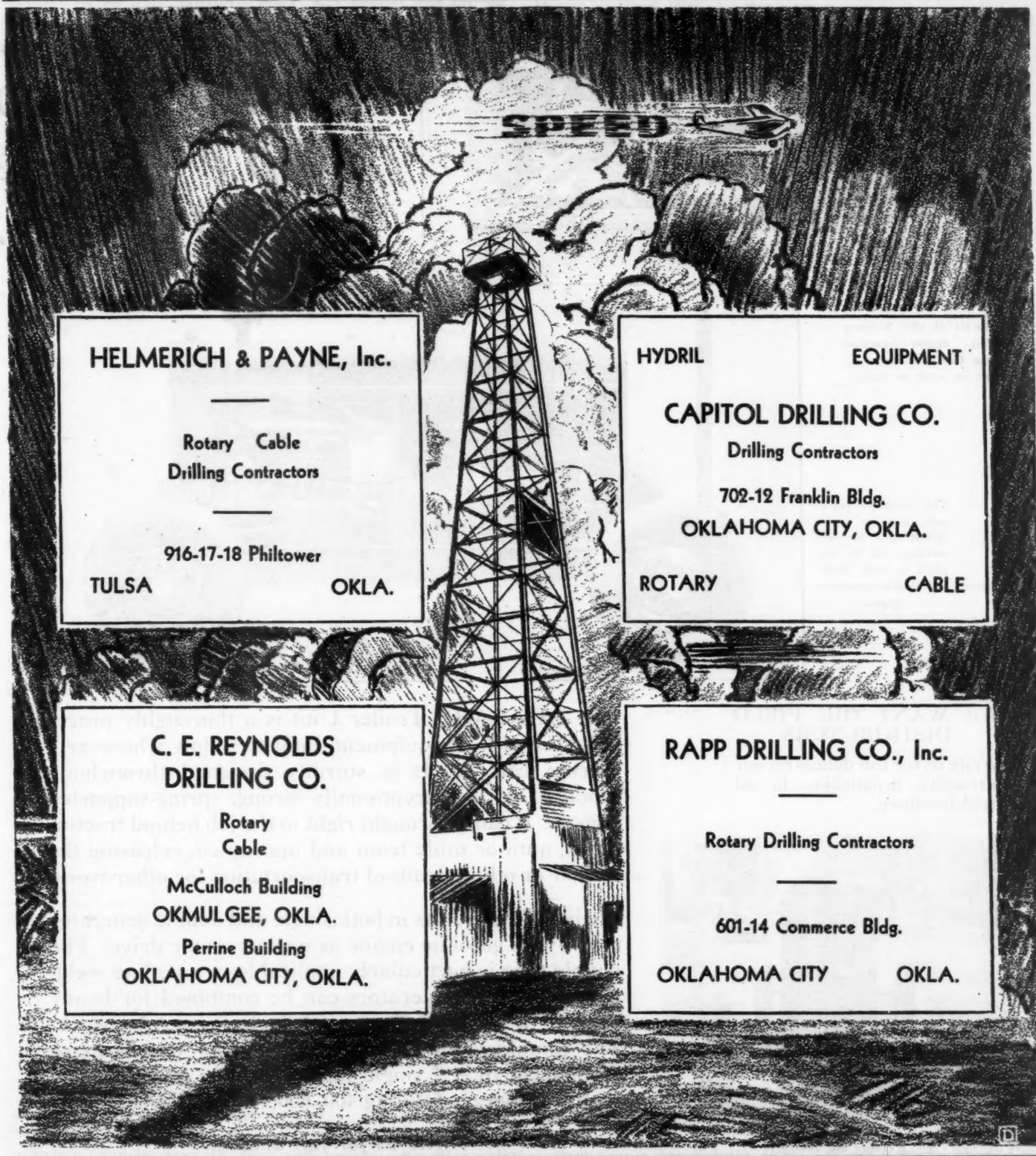
Dixon et al's No. 1 Bell, 330 ft. N, 1,320 ft. W, Sec. 102, Blk. 21, H.&G.N. Sur. ..... Rigging up.

DONLEY COUNTY

Blue Bonnett Oil Co.'s No. 1 Ball, 1,075 ft. N, 985 ft. E, Sec. 22, Blk. E, D.&P.R.R. Sur. ..... T.D. 3,006 ft; contract depth.

(Continued on Page 323)

ACTIVE DRILLING CONTRACTORS



HELMERICH & PAYNE, Inc.

Rotary Cable
Drilling Contractors

916-17-18 Philtower
TULSA OKLA.

HYDRIL EQUIPMENT

CAPITOL DRILLING CO.

Drilling Contractors

702-12 Franklin Bldg.
OKLAHOMA CITY, OKLA.

ROTARY CABLE

C. E. REYNOLDS DRILLING CO.

Rotary
Cable

McCulloch Building
OKMULGEE, OKLA.
Perrine Building
OKLAHOMA CITY, OKLA.

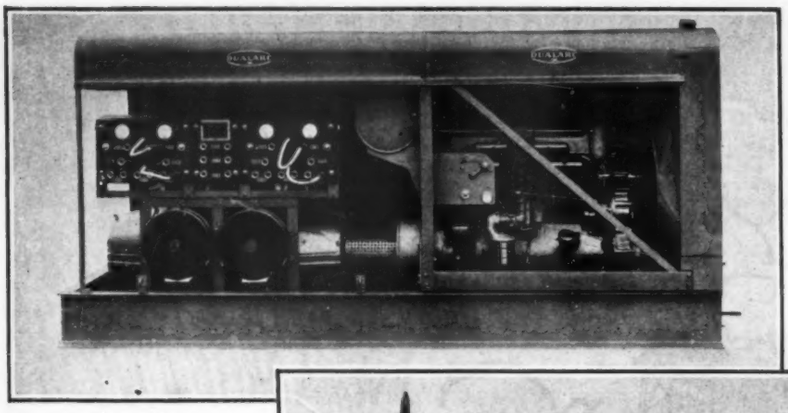
RAPP DRILLING CO., Inc.

Rotary Drilling Contractors

601-14 Commerce Bldg.
OKLAHOMA CITY OKLA.

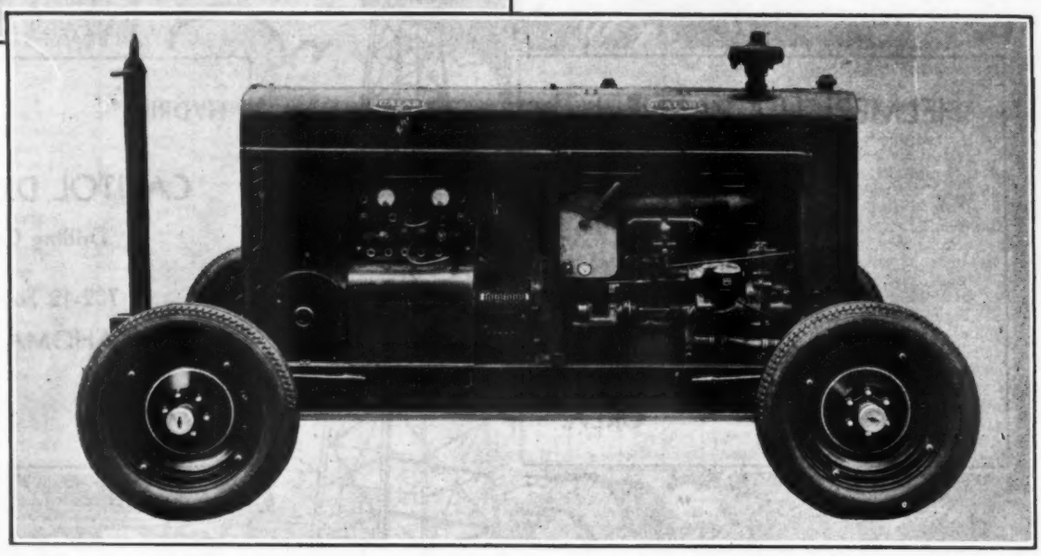
MODERN EQUIPMENT · DEPENDABILITY · EXPERIENCE

DUALARC WELDING UNIT



..the easy answer to pipe line welding..

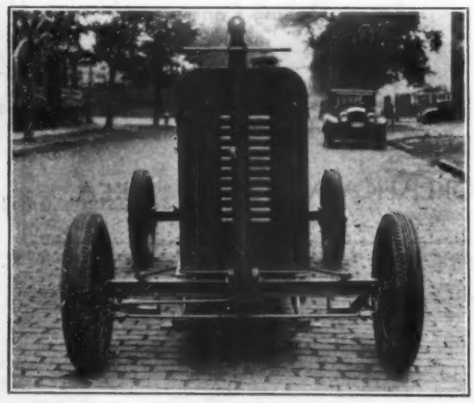
The DUALARC Welding Unit, double-generator type. Can be mounted direct on truck or tractor.



The complete trailer unit, gasoline engine driven, ideal for field welding; can be supplied in both single- and double-generator types.

WE WANT OIL FIELD DISTRIBUTORS

Write us for full details on our attractive proposition in oil field territory.



Notice low center.

The DUALARC Trailer Unit is a thoroughly practical piece of field equipment, built to follow wherever a tractor can go. It is sturdily designed throughout, mounted on an exceptionally strong, spring-supported chassis. It can be brought right to the job behind tractor, truck, auto or mule team and uncoupled, releasing the tractor or other means of transportation for other work.

We build these units in both single and double generator types, with gasoline engine as well as motor drive. The double type is particularly applicable to pipe line welding, as the two generators can be combined for heavy welding or cutting, or operated singly for regular work. The combined unit is only 50% heavier and is more economical than 2 single units. Built in four sizes, to supply amperage totaling 400, 600, 800, or 1,000.

Write us for full details.

ELECTRIC ARC CUTTING & WELDING CO.

152 Jelliff Ave. Newark, N. J.

OKLAHOMA FIELDS

(Continued from Page 96)

plugged back is now shut in as a gas well. Sinclair Oil & Gas Co.'s No. 1 Howell, C SW SW Section 14-26-24w, was drilled to a total depth of 8,589 feet, and it was believed to be still in the Mississippian formation. It was plugged back to 5,350-5,400 feet and was shot at that depth. The gas gauged 15,000,000 feet, and the gasoline 200 bbls. a day. The only other test drilling in the county is the Empire Oil & Refining Co.'s test in the southeastern part of the county. Woods County has had a number of wildcat tests, all of which were drilled deep without success. Sinclair Oil & Gas Co.'s No. 1 Stewart, in C SW SW Section 33-27-16w, had a hole full of water in the Wilcox sand and was drilling to the second Wilcox sand at 7,256 feet. It had several showings of oil and gas while drilling.

Alfalfa County has had a number of shallow tests, with J. V. Bailey's No. 1 Acre, SW cor. NE Section 14-24-11w. shut down at 4,660 feet. It is the first deep test in the area. Nitrogen gas was found in a core-drilled test in the southern part of Alfalfa County. In one hole the gas blew the tools up in the hole from a total depth of 600 feet. The gas was noninflammable and resulted in activity from a leasing standpoint. It was allowed to blow out for about two weeks with little pressure lost and the hole was then plugged.

Development in Kay County is being revived in scattered parts of the county. Southwest of Tonkawa several blocks of leases have been assembled during the last few months in the semiproven areas and undrilled territory in that area. Old wells are being drilled deeper. The area southwest of Tonkawa was one of the first producing districts in the county. Shallow gas was found at 450 to 1,900 feet and oil was found at 1,900 to 2,900 feet.

Magnolia Petroleum Co.'s No. 1 Wood, NE cor. SW Section 29-6-6, Seminole County, extended production in the Konawa Pool a quarter-mile south in the last week when it made 913 bbls. in six hours from the regular sand at 2,800-03 feet.

Completed Wells

New wells are being added to the Oklahoma City Field at the rate of about 25 a week. On the recent survey the field had 205 drilling tests and about 35 locations and rigs. The wells completed during the week ending September 27 were as follows: Indian Territory Illuminating Oil Co.'s No. 2 Corff, in Section 11-11-3w, flowed 812 bbls. the first 16 hours from sand at 6,325-6,585 feet. Same company's No. 5 Carrico, in Section 14-11-3w, made 1,335 bbls. in 15 hours from sand at 6,370-6,595 feet. Same company's No. 1 Funk, in Section 11-11-3w, flowed 6,036 bbls. the first 16 hours from sand at 6,345-6,573 feet. Same company's No. 2 Starkey, in Section 11-11-3w, made 4,202 bbls. the first 16 hours from sand at 6,185-6,529 feet. Same company's No. 5 Ferndale, in Section 11-11-3w, made 2,548 bbls. the first 16 hours from sand at 6,285-6,579 feet. Same company's No. 7 Theimer, in Section 12-11-3w, flowed 1,190 bbls. the first 14 hours from sand at 6,270-6,395 feet. Same company's No. 2 Salsman, in Section 32-11-2w, a worked over reconditioned well, made 294 bbls. of oil and 684 bbls. of water in 24 hours. Phillips Petroleum Co.'s No. 1 Cary, in Section 2-11-3w, flowed 135 bbls. in one hour from sand at 6,285-6,530 feet. Anderson-Prichard Oil Corp.'s No. 3 Gibbons, in Section 2-11-3w, flowed 920 bbls. the first three hours from sand at 6,150-6,493 feet. Same company's No. 1 Orphanage, made 910 bbls. the first 12 hours from sand at 6,290-6,564 feet. Same company's No. 3 Roosevelt, in Section 2-11-3w, flowed 6,015 bbls. the first nine hours from sand at 6,355-6,457 feet. Same company's No. 4 Roosevelt, in Section 2-11-3w, flowed 345 bbls. the first hour from a total depth of 6,456 feet. Same company's No. 2 Roosevelt, in Section 2-11-3w, made 6,626 bbls. the first nine and one-half hours from sand at 6,070-6,425 feet, Gant & Garvin's No. 1 Harris, in Section 2-11-3w, flowed 2,210 feet from sand at 6,385-6,540 feet. Tom Slick Oil Co. and others' No. 1 Key, in Section 2-11-3w, made 245 bbls. the first 15 hours from sand at 6,230-6,413 feet. Same company's No. 3 Classen, in Section 2-11-3w, flowed 9,140 bbls. the first four and one-half hours from sand at 6,248-6,570 feet. Same company's No. 1 Thornton made 383 bbls. the first half hour from sand at 6,365-6,542 feet. Independent Oil & Gas Co.'s No. 1 Lybrand, in Section 2-11-3w, made 5,495 bbls. the first two and three-quarters hours from sand at 6,266-5,343 feet. Plains Petroleum Co.'s No. 1 Schillings, in Section 10-11-3w, flowed 1,310 bbls. the first four and one-half hours from sand at 6,307-6,512 feet. Cromwell-Franklin Oil Co.'s No. 26 Trosper Park, flowed 6,589 bbls. the first fifteen and one-quarter hours from sand at 6,354-6,422 feet. C. C. Julian Oil & Royalty Co.'s No. 3 Walker, in Section 10-11-3w, flowed 508 bbls. the first hour from sand at 6,275-6,496 feet. Prairie Oil & Gas Co.'s No. 3 Sigmon, in Section 32-11-2w, flowed 1,595 bbls. the first 16 hours from a total depth of 6,675 feet.

Oklahoma City's Shut-in Production

The initial production of the shut-in wells in the Oklahoma City Field that have been allowed to produce for 24 hours or less as of September 27 was 897,569 bbls. from 185 wells. These wells are now shut in for the proration period. The initial production and the approximate date on which each well will be opened for its regular producing period follow:

	No.	B'bls.	Hrs.	Date
I. T. I. O.:				
Jones	13	36,186	..	9-28
W. J. Phillip	1	7,586	10¼	9-29
Jones	14	562	1	9-30
Corff	1	917	12	10- 3
Habegger	1	3,296	12	10- 4
Petersson	5	3,755	21½	10- 5
Phillips	1	7,586	10¾	10- 5
Carrico	1	9,744	..	10- 4
Coppenger	1	10,010	..	10- 5
Watters	5	1,544	21	10- 5
M.-K.-T.	1	3,264	19¾	10- 6
H. G. Trosper	3	7,002	..	10- 6
Boulevard	1	891	14	10-13
Huffman	1	3,015	..	10-12
Watters	6	3,362	..	10-10
Lemon	2	4,502	..	10- 9
Watters	4	2,702	..	10- 9
H. G. Trosper	3	14,720	..	10- 9
R. Hemmer	1	1,340	18	10-20
Ferndale Com.	4	5,966	5	10-20
Pasadena Heights	2	2,626	12	10-19
State Land	5	3,524	16½	10-18
S. Peterson	6	10,356	19¾	10-17
C. Trosper	4	482	½	10-30
Mid Texas	1	4,864	18	10-30
Coppenger	5	3,465	20	10-20
Starkey	1	716	12	10-30
M. Unsell	3	1,399	14½	10-30
Capshaw	1	740	15¾	10-23
Habegger	2	3,036	18	10-23
E. W. Jones	3	15,885	18	10-23
B. Johnson	7	1,400	Est.	11- 6
C. Trosper	3	4,000	Est.	11- 6
S. Peterson	7	6,612	22	11- 5
Carrico	2	3,497	16	11- 4
Eacock	1	1,351	16	11- 4
Handel	1	1,824	16	11- 4
S. Peterson	8	4,396	22	11- 4
E. Williams	1	4,132	17	11- 3
Brown	1	3,705	12	11- 3
Johnson	8	581	14	11- 2
M. Sudik	10	24,000	Est.	11- 9
R. Hemmer	2	4,000	Est.	11- 9
Coppenger	6	4,400	Est.	11- 9
Corff	4	941	3	11- 8
Coppenger	7	1,582	15	11- 8
Coppenger	2	515	12	11- 8
Johnson	6	2,388	10¼	11- 8
M. Unsell	4	96	½	11- 7
Mt. Vernon	1	909	16	11- 7
M. Unsell	6	3,666	..	11- 7
Spillman	4	5,451	10¼	11- 7
Precure	2	5,977	18	11- 6
Eacock	2	3,079	..	11- 6
Theimer	6	1,993	..	11- 6
Salsman	5	273	..	11- 6
Phelan Addition	1	2,000	Est.	11-19
H. G. Trosper	4	1,625	5	11-19
Jones Community	4	1,632	16	11-19
L. Jones	12	3,875	16	11-18
M. Knox	4	274	½	11-17
Magnolia Heights	1	2,814	16	11-18
Precure	1	1,393	5	11-18
J. Corff	5	3,827	16	11-18
Frendal Com.	5	3,500	Est.	11-26
Starkey	2	4,202	16	11-26
H. G. Trosper	7	7,200	Est.	11-26
Funk	1	6,036	16	11-26
Sudik	11	16	1¼	11-24
Carrico	3	366	(†)	11-23
Coppenger	3	507	16	11-22
Theimer	7	1,190	14	12- 1
Carrico	5	1,335	15	11-29
Corff	2	812	16	11-28
W. Franklin:				
Theimer	8	20,000	Est.	9-29
Holder	1	3,000	Est.	10- 6
Page	1	7,209	..	10- 2
Page	2	262	..	10-29
Theimer	7	5,077	16	10-16
Theimer	11	6,528	1¼	10-30
Lowery	9	8,756	16½	10-26
Wright	3	6,796	10¼	11- 3
Theimer	13	4,098	16	11- 8
Holden	2	2,092	12	11-19
Wright	2	7,000	Est.	11-17
Theimer	10	1,127	13	11-18
Lowery	10	746	1¼	11-18
Theimer	12	3,863	16	11-24
Page	4	2,707	16	11-24
Lowery	11	3,597	16	11-24
Theimer	9	2,987	4	11-22
Cromwell:				
Trosper Park	25	960	2	10-20
Trosper Park	27	187	¼	10-19
Trosper Park	26	6,589	15¼	12- 1
Sinclair:				
School Land	5	8,808	6	10-24
Vinci	6	10,500	6	10- 1
Vinci	15	175	½	10-19
Vinci	10	340	4	10-18
Vinci	13	429	16½	11-19
Coline:				
Clauer	9	11,948	..	9-24
Clauer	13	545	14	10-10
Clauer	12	1,401	..	10-18
Clauer	7	968	20	10-17
Clauer	14	427	..	11-22
Warren	*7	8,826	..	9-25
Slick:				
Crawford	1	13,883	..	9-28
Baker	1	1,428	17	10- 5
Baker	2	10,250	19¾	10-11
Milner	*2	12,886	..	10- 2
Page	1	3,433	21	10-13
Page	2	1,090	5	10-20
Frost Heights	1	3,987	19¾	10-18
Frost Heights	2	....	..	....
Alexander	1	330	2	10-19
Campbell	1	13,875	8	10-30
Foote	2	464	2	11- 4
Atkinson	1	11,340	18	10-26
Trumbley	1	2,611	18	10-26
Frost Heights	4	4,368	19¾	11- 4
Baker	3	3,155	13	11- 3
Atkinson	2	10,338	18	11- 2
C. C. Frost	1	1,097	9½	11- 9
Houston	1	582	2	11- 9
Moore	1	1,333	14	11- 8
Classen	2	9,644	10¼	11- 6
Alexander	2	987	10¼	11- 6
Gleason	1	3,302	16	11-19
Miller	1	2,011	14½	11-19
Danruthers	3	2,026	14	11-19
Frost Heights	3	97	½	11-19
Harrison	1	1,895	16	11-22
Thornton	2	294	24	12- 2
Thornton	1	383	½	12- 2
Classen	3	9,140	4¼	12- 2
Key	1	245	15	11-30
Mid-Texas:				
Hiddleston	1	2,320	..	10- 2
Hall & Briscoe:				
Holmes	3	7,201	9	10-20
Holmes	2	4,032	6	10-20
Holmes	5	67,000	Est.	11-18
Lindsey	3	48,000	Est.	11-22
Phillips Pet. Co.:				
Traders Comptio.	1	4,055	..	9-25
Carey	1	135	1	11-29
Prairie:				
Sigmon	4	7,520	..	10- 8
Sigmon	5	4,240	6	10-30
Sigmon	7	2,565	16½	10-24
Sigmon	6	2,070	4	11- 8
Sigmon	2	2,580	4	11- 8
Shell:				
Egermeyer	1	2,043	13	10-10
Plains & Denver:				
Boulevard	1	4,968	..	10-12
Sadler	1	450	1¼	11-19
Schillings	1	6,500	Est.	11-26
Century Pet. Co.:				
Wyatt	*1	3,000	Est.	10-14
Barr	1	3,933	7¾	11-19
Independent:				
Hatcher	1	5,339	..	10-18
Harrell	1	1,150	13	11- 2
Lybrand	1	5,495	2¾	12- 1
Julian:				
Community	1	4,364	..	10-18
Hauser	1	3,600	Est.	10-20
Walker	3	2,263	2¼	12- 2
Skelly Oil Co.:				
Dillon	2	4,640	12	10-23
Ainsworth	4	3,645	12	10-30
Tanner	1	2,790	12	11- 3
Ainsworth	3	1,115	11¼	11- 4
Ainsworth	2	1,665	8	11- 4
Tanner	2	2,725	3	11- 9
Mabee & Blackstone:				
Harvey	1	675	3	10-25
Schillings	1	28,000	Est.	11-26
Rusty	1	1,807	1¼	11-23
Marce Oil Co.:				
Holder	1	2,600	18	11- 2
Anderson & Prichard:				
Pest House	1	10,165	21	11- 3
Roosevelt	1	10,000	Est.	11- 6
Pest House	2	1,090	2	11-19
Wilson	1	710	4	11-23
Graham	1	1,960	12	11-22
Keys	1	875	3	11-21
Gibson	3	15,000	Est.	11-26
Roosevelt	4	1,974	3	12- 2
Roosevelt	3	6,015	9	12- 1
Orphanage	1	910	12	11-30
Roosevelt	2	6,616	9½	11-29
Champl'n Oil & Ref.:				
McKeehan	1	4,480	11½	11- 6
Jones & Blackwell O. & G.:				
Townlot	1	10,000	Est.	10-25
Continental Oil Co.:				
Sudik	2	320	..	11-18
Mid-Kansas O. & G.:				
Mollman	4	3,254	16	11-19
Minnehoma:				
Pugh	1	22,746	9	11-23
Blackwell:				
Clemen	1	3,080	16½	11-25
Phillips Pet. Co.:				
Carey	1	2,400	Est.	11-26
Gant & Garvin:				
Harris	1	2,210	19½	11-30
Total	185	897,569		

*Wells producing from the Silicious lime. All others are producing from the Simpson sand. †Pick up oil.

Greater Seminole Production

Production continues at steady levels from the Greater Seminole area under the curtailment plan. The total daily average for the week ending September 2 was 213,417 bbls. from 2,837 wells, in the pools listed below. The Seminole area averaged 144,728 bbls. from 1,875 wells. The daily average gauges from the different pools follow:

Pool—	Wells	Bbls.
Little River	372	24,782
East Little River	86	12,728
Carr City	63	9,687
Maud	135	3,702
Mission	95	7,162
Bowlegs	278	14,893
Earlsboro	286	20,423
South Earlsboro	26	8,765
East Earlsboro	156	18,338
Seminole	259	14,760
East Seminole	33	2,116
Searight	86	7,372
Allen	274	14,218
Asher	26	1,171
West Asher	27	7,286
Konawa	97	15,966
St. Louis	487	24,765
Sasakwa	61	5,283
Total	2,837	213,417

Greater Seminole Oil Shipments

The pipe line shipments from the Greater Seminole area averaged approximately 14,000 bbls. a day less than the preceding week for the week ending September 22. The total shipments were 191,257 bbls. The daily average shipments from the various pools were as follows:

Company—	Seminole (bbls.)	Asher, Pearson, St. Louis (bbls.)	Konawa (bbls.)
Barnsdall	2,422	....	....
Champlin	6,434	....	472
Continental	....	....	....
Consolidated	....	286	....
Cosden	5,928	....	4,192
Deep Rock	3,225	682	....
Empire	4,251	....	....
Gulf	17,684	2,172	754
Independent	....	1,661	....
Magnolia	6,016	6,434	....
Oklahoma	26,073	271	265
Prairie	14,788	4,854	3,944
Prod. & Ref.	942	....	....
Pure	4,609	....	....
Shell	4,672	279	1,320
Sinclair	27,651	7,155	3,726
Texas	6,911	1,928	1,729
Tidal	6,718	3,850	....
White Oak	980	....	....
Total	141,305	29,572	16,403
Tank cars	2,734	1,243	....
Grand total	144,039	30,815	....

Oklahoma City Oil Shipments

The total shipments from the Oklahoma City Field were 571,655 bbls. for the week ending September 22. The daily average shipments by companies were as follows:

Company—	Dy. Ave.
Empire	18,791
I. T. I. O.	3,518
Magnolia	8,988
Oklahoma	9,422
Prairie	15,861
Sinclair	21,857
Shell	320
Tidal	1,327
Cunard Pipe Line	928
Healdton	143
Total	81,665

Actual Production

The daily average production from the Oklahoma City Field for the seven days ending September 22, with the date, number of barrels produced each day, number of wells on production and the total number of wells completed each day, follows:

Date—	Bbls.	Wells prod.	Wells comp.
Sept. 23	80,839	56	559
Sept. 24	104,931	53	563
Sept. 25	67,451	54	565
Sept. 26	137,963	61	565
Sept. 27	116,771	67	573
Sept. 28	126,952	55	573
Sept. 29	96,125	62	573

Beckham County

Ramsey Petroleum Co. and W. R. White's No. 1 Franklin, C NE NE. Section 27-9-23w, has been completed for 25,000,000 feet of gas in sandy lime 2,512-2,638 feet.

Caddo County

Magnolia Petroleum Co. made location for No. 4 Medrano, NE cor. SW, Section 36-6-10w.

Comanche County

Ashcroft & Ponder, NE cor., Section 29-2-10w, has been completed for 2 bbls. in sand 836-50 feet.

Hughes County

Independent Oil & Gas Co.'s No. 2 Jackson, NE cor. SE SE, Section 17-7-8, is dry and abandoned at 3,275 feet. The Prairie Oil & Gas Co.'s No. 1 Harris,

NE cor. NW, Section 8-6-8, has been abandoned at 3,207 feet.

Cleveland County

The Prairie Oil & Gas Co., Thomas B. Slick and Phillips Petroleum Co.'s No. 1 Reynolds, NE cor. SE NW, Section 6-10-2w, Oklahoma City Field, has been abandoned at 5,615 feet.

Oklahoma County

Oil, Inc.'s No. 1 Thompson, SW cor. NW NW, Section 2-11-3w, Block 5, Lot 19, Reno Addition, Oklahoma City Pool, is a rig. The cellar has been dug for No. 1 Hathaway, Block 1, Lot 22, Banner Addition, SW cor. SE SW NW, Section 2-11-3w. Phillips Petroleum Co.'s No. 1 Mosey, Block 5, August Addition, SE cor. NE SE NW, Section 3-11-3w, is a cellar. Location has been made for No. 1 Blazier, Block 10, Lot 5, Eckroat Addition, NW cor. NE SE NW, Section 10-11-3w. Wirt Franklin Petroleum Corp.'s No. 4 Page, SW cor. SE SE, Section 35-12-3w, has been completed for 2,707 bbls. in 16 hours from sand 6,280-6,502 feet. Indian Territory Illuminating Oil Co. and others' No. 1 Phillips, SE cor. NW SW, Section 1-11-3w, made 11,055 bbls. in 16½ hours from sand 6,400-95 feet. Wirt Franklin Petroleum Corp.'s No. 12 Theimer, NW cor. NE SE, Section 2-11-3w, has been completed for 3,863 bbls. in 16 hours from sand 6,162-6,523 feet. Thomas B. Slick Oil Co.'s No. 1 Harrison, NE cor., Section 10-11-3w, had sand 6,317-6,554 feet and made 1,895 bbls. in 16 hours. Indian Territory Illuminating Oil Co. and others' No. 3 Coppinger, SE cor. NE NW, Section 11-11-3w, has been completed for 523 bbls. in 16 hours in sand 6,300-6,548 feet. No. 2 Corff, SW cor. SE SW, Section 11-11-3w, made 812 bbls. in 16 hours in sand 6,325-6,585 feet. No. 5 Ferndale Community, SE cor. NW NE, Section 11-11-3w, has been completed for 2,548 bbls. in 16 hours in sand 6,285-6,579 feet. No. 1 C. Funk, SW cor. SE NE, Section 11-11-3w, produced 6,036 bbls. in 16 hours from sand 6,345-6,573 feet. No. 2 Starkey, SW cor. NE SE, Section 11-11-3w, made 4,202 bbls. in 16 hours from sand 6,160-6,529 feet. Wirt Franklin Petroleum Corp.'s No. 10 Lowery, NE cor. NW NW, Section 12-11-3w, gauged 10,300 bbls. in 16 hours producing from sand 6,293-6,465 feet. Wirt Franklin Petroleum Corp.'s No. 11 Lowery, NE cor. NW, Section 12-11-3w, has been completed for 3,597 bbls. in 16 hours in sand 6,432-6,485 feet. Indian Territory Illuminating Oil Co. and others' No. 4 Carrico, NE cor. NW NW, Section 14-11-3w, was completed for 3,670 bbls. in 16 hours in sand 6,400-6,564 feet. No. 5 Carrico, NW cor., Section 14-11-3w, flowed 1,407 bbls. in 16 hours from sand 6,370-6,595 feet. No. 5 Mary Unsell, NW cor. SW NE, Section 23-11-3w, has been completed in sand 6,340-6,591 feet for 740 bbls. in 16 hours. Coline Oil Co.'s No. 8 Olds, C NW, Section 24-11-3w, flowed 541 bbls. in sand 6,290-6,590 feet. Sinclair Oil & Gas Co.'s No. 13 Vencl, NW cor. SE SE, Section 31-11-2w, has been completed for 429 bbls. in 16½ hours from sand 6,380-6,639 feet. Indian Territory Illuminating Oil Co. and others' No. 14 Jones, SE cor. SW NW, Section 31-11-2w, has been completed for 19,614 bbls. in sand 6,460-6,608 feet.

Osage County

Atlantic Oil Producing Co. has moved a machine in for No. 8, CNL S half SW, Section 19-25-8. Continental Oil Co. and the Prairie Oil & Gas Co.'s No. 6, CWL NE SE, Section 5-23-9, is a rig. Indian Territory Illuminating Oil Co.'s No. 436, SW cor. NE SE, Section 6-26-12, has been completed for 7,000,000 feet of gas in Mississippi lime 1,540-65 feet. A. G. Oliphant's No. 2, SW cor. SE NE, Section 10-21-8, made 100 bbls. in Red Fork sand 2,354-93 feet. Turman Oil Co.'s No. 1, SW cor. NW, Section 11-21-8, has been abandoned at 3,015 feet.

Pawnee County

Magnolia Petroleum Co. is moving rig material in for No. 3 Newell, NE cor. SW SW, Section 2-20-6. Hay and others' No. 1 Wails, SW cor. NE NE, Section 14-20-9, is a machine. Williams and others' No. 1 Kinney, CNL NE NE, Section 2-20-8, has been completed for 10 bbls. at 2,390 feet after plugging back from 3,020 feet in Wilcox sand. Nadine Oil Co.'s No. 6 Martin, CNL SW NE, Section 7-20-8, is dry and abandoned at 3,115 feet. Hay and others' No. 7 Copeland, CSL NW SW, Section 26-20-9, has been completed for 40 bbls. in Red Fork sand 2,150-89 feet.

Pottawatomie County

Twin State Oil Co. has the rig on the ground for No. 2 Sowers, NE cor. NW SE, Section 23-6-3, West Asher Pool. Indian Territory Illuminating Oil Co. moved the rig in for No. 6 Davidson, SE cor. NW, Section 23-6-3. Empire Oil & Refining Co. has the cellar dug for No. 2 Alexander, NW cor. SW SE, Section 23-6-3. The Prairie Oil & Gas Co. made location for No. 1 Ingram, SW cor. NW NE, Section 28-9-5. Clark & Cowden's No. 2 Earlsboro Townsite, NW cor. SE SW NW, Section 8-9-5, Earlsboro Pool, has been abandoned at 3,496 feet after plugging back from 4,393 feet in Wilcox sand. The Texas Company and others' No. 1 Ogee, NE cor. SE NE, Section 17-8-5, drilled to the Wilcox sand 4,280 feet and plugged back to 4,072 feet where it has been completed for 100 bbls. from Hunton lime. J. H. Gwin and others' No. 2 Coley, SW cor. SE SE, Section 24-7-4, St. Louis Field, swabbed 370 bbls. in Simpson sand 4,141-53 feet. Wilcox Oil & Gas Co.'s No. 5 Warren, SW cor. NE SW, Section 23-6-3, has been completed for 195 bbls. in sand 3,481-3,506 feet. Deep Rock Oil Corp.'s No. 1 Gibson, NW cor. SE, Section 23-6-3, swabbed 524 bbls. from sand 3,441-58 feet.

Seminole County

Amerada Petroleum Corp.'s No. 2 Tiger, SW cor. SE NW, Section 3-8-5, Carr City Field, is rigging up. The rig is being erected for No. 3 Tiger, NE cor. NW SW, Section 3-8-5. Empire Oil & Refining Co. is building the rig for No. 4 Brown, SE cor. NE SE, Section 3-8-5. Pure Oil Co.'s No. 1 Tiger, SW cor. NE SW, Section 3-8-5, is rigging up. Harris and others' No. 1 Davis, NW cor., Section 28-6-6, Konawa Pool, is a cellar. Carter Oil Co. is building the rig for No. 3 Wilson, SW cor., Section 12-7-6, Little River Pool. Carter Oil Co.'s No. 6 Coker, SE cor. NE SW, Section 2-8-5, Carr City Pool, has been completed for 2,250 bbls. in Wilcox sand 4,210-17 feet. Empire Oil & Refining Co. and others' No. 1-D Fish, NE cor. SE SE, Section 19-7-8, Holdenville area, has been completed for 1,000 bbls. in sand 3,060-84 feet. W. B. Pine's No. 4 Chaparney, NW cor. NE, Section 20-6-6, Konawa Pool, swabbed 470 bbls. from sand 2,902-24 feet. Crosbie & Moran's No. 1 Caesar, NW cor. SW NW, Section 28-6-6, is dry and abandoned at 3,704 feet.

Stephens County

Pace and others' No. 2 Dilley, NE cor. NW SW, Section 27-2s-7w, is drilling at 940 feet.

Creek County

Indian Territory Illuminating Oil Co.'s No. 1 Hinton, NE cor. NW SW, Section 25-19-8, is an old well drilling deeper at 2,370 feet. Johnson Oil & Refining Co. moved a machine in for No. 2 Henneha, SW cor. SE, Section 11-19-9. Phillips Petroleum Co. and Gled Oil Co.'s No. 5 Carter, SW cor. NE SE, Section 20-19-9, is rigging up. H. U. Bartlett's No. 1-A Sneed, CEL NW NW, Section 20-18-9, is rigging up. C. L. Freeland and others made location for No. 3 Strip, SW cor. SE NE, Section 36-15-7. Gilcrease Oil Co.'s No. 1-A Bright, SE cor., Section 26-17-9, has been completed for 2,000,000 feet of gas in sand 560-90 feet. O. M. Irelan's No. 3 Smith, CWL NE SE, Section 11-17-10, has been completed for 5 bbls. in Red Fork sand 1,945-80 feet after plugging back from 2,550 feet. Olean Petroleum Co.'s No. 4 Bigpond, NW cor. SE NE, Section 36-15-7, has been deepened from 3,244 feet to 3,253 feet and gauged 35,000,000 feet of gas. Jenkins and Atlantic Oil Producing Co.'s No. 2 Kimble-Reading, NW cor. SW, Section 23-14-10, has been abandoned at 3,331 feet.

Lincoln County

T. J. Hughes and others made location for No. 1 Hall, SE cor. NW SW, Section 25-17-3. Thomas B. Slick Oil Co. has the rig on the ground for No. 1 Altoff, NE cor. NW, Section 18-14-4.

McIntosh County

Deep Fork Oil Co.'s No. 1 M. Williams, C SE SE, Section 34-12-14, has been abandoned at 760 feet. No. 2 J. Williams, C SE NE, Section 34-12-14, made 750,000 feet of gas in sand 712-33 feet.

Muskogee County

John Aggas has a machine on the location for No. 6 Hawkins, NE cor. SE SE, Section 28-16-15. W. N. Harsha and others' No. 2 J. Ware, NE cor. NW NW, Section 8-15-15, is rigging up. Wilson & Johnson's No. 2 C. Jordan, NE cor. SW SE, Section 14-13-18, is spudding. G. M. Gillespie's No. 1 C. Sheppard, C SW SW, Section 35-12-19, is a machine. J. F. Dunbar's No. 1 West, NE cor. SE NE, Section 3-11-19, has drilled to 735 feet and shut down. Hoover Brothers' No. 1 S. Drew, SW cor. NE SE, Section 17-15-18, has been completed for 750,000 feet of gas in sand 1,226-46 feet. C. E. Creager's No. 2 Muskogee Townsite, Block 331, C NE NW, Section 35-15-18, is a dry hole at 1,185 feet. Indian Territory Illuminating Oil Co.'s No. 1 Lacey, C SE NW, Section 31-12-19, has been completed for 1,600,000 feet of gas in sand 721-45 feet.

Okfuskee County

Parkhill and others' No. 1-A Rentie, NW cor. SW, Section 24-12-11, is drilling at 400 feet. Baroda Oil Co.'s No. 3 Adams, CSL SW NE, Section 23-11-11, has been completed for 10 bbls. in sand 2,404-20 feet. Wells and others' No. 2 Fields, NW cor. SW NW, Section 13-10-11, made 20 bbls. in sand 2,160-73 feet.

Okmulgee County

Rossiter Oil Co.'s No. 6 A. Burgess, NW cor. SE NW, Section 20-12-13, is rigging up. F. D. Misener's No. 4 Z. Colbert, SW cor. NW NE SW, Section 14-14-14, made 12 bbls. in sand 1,044-55 feet. Rossiter Oil Co.'s No. 5 A. Burgess, SW cor. NE NW, Section 20-12-13, has been completed for 1,000,000 feet of gas in sand 1,105-65 feet.

MORE ACTIVITY IN RUSK COUNTY AWAITS TESTING OF JOINER WELL

By L. E. Bredberg

Fort Worth Bureau, The Oil and Gas Journal

FORT WORTH, Tex., Sept. 29.—With most of the major companies assuming a hands-off policy in regard to the immediate area surrounding the C. M. Joiner and associates' test on the Daisy Bradford farm in the Juan Ximenes Survey in central Rusk County until it is tested, Wednesday, October 1, was designated as the day when operators and company men watching the well should either receive definite data on which to jump into action in leasing activities or be lulled back to the status they had assumed before the test made a good high gravity oil showing several weeks ago at a total depth of 3,292 feet.

There has been widespread activity in Rusk County, and the adjoining counties, especially Gregg to the north and Cherokee to the west, with checkerboarding of acreage and several blocks being taken, but if the test proves a producer, what has gone before will be but a small amount compared to activity that will be generated by a commercial well. Several tentative locations have been reported, but nothing definite done in regard to staking them and moving in material, but as the acreage will be cut up in many small tracts in the vicinity of the test, derricks will probably spring up like mushrooms if the well shows up for a producer.

Outside Van Pool

Broderick and Calvert completed another interesting well in the area outside of the Van Pool unit plan, Van Zandt County, to the northeast, about midway between the pool proper and Humble Oil & Refining Co.'s No. 1 Carroll in the William Daniel Survey. It is located on a 2.07-acre strip of the M. F. Shirley farm. The well was completed at a total depth of 2,932 feet after topping the Woodbine sand at 2,752 feet. It made 109 bbls. the first hour through an eleven-sixty-fourths-inch choke with 310 pounds open pressure on the tubing; 103 bbls. the second hour, and 109 bbls. the third hour on an official proration gauge, and takes its place with the best wells of the Van Pool. The Pure Oil Co. holds all offset leases to the well. Broderick and Calvert will drill another location to the east of this well.

The Texas Company's No. 2 Carter, in the southwest corner of the G. W. Carter 171-acre farm in the William Daniel Survey, has been abandoned at a total depth of 3,039 feet, definitely limiting the Carroll district of the Van Pool on the northeast. It was cemented back to 3,006 feet after encountering salt water at 3,039 feet, and swabbed dry after running 2½-inch tubing. The test topped the Austin or second chalk at 2,633-2,796 feet and the Woodbine sand at 2,961 feet. It is an east offset to The Texas Company's No. 1 Carter which is a producer.

Van Has 111 Producers

There were 111 producing wells in the Van Pool, including the Carroll district, on September 16, when the potential of the field was gauged as 220,742 bbls. through an eleven-sixteenths-inch choke. Total daily allowance is 27,521 bbls.

Pure Oil Co.'s No. 1 J. T. Petty, in the southern corner of the 101.7-acre farm in the Nacogdoches County School Lands Survey, Van Zandt County, was another western extension to the Van Pool. It was completed this week at a total depth of 2,960 feet for 153 bbls. the first 24 hours on an eleven-sixteenths-inch choke. It is approximately 2,000 feet west of production, and 2,000 feet north of Pure Oil Co.'s No. 1 Howell which was formerly completed and extended the pool in this direction.

East Central Texas Production

Daily average production of the pools in the East Central Texas area for the week ending September 27 follows:

Boggy Creek	3,600
Cedar Creek	45
Currie	315
Hill County	30
Mexia	4,077
Minerva	545
Nigger Creek	160
Powell	5,367
Richland	145
Thrall	41
Van	27,147
Wortham	635
Total	42,107
Week ending September 20	41,600
Increase	507

COMPLETIONS IN EAST CENTRAL TEXAS

Delta County

C. A. Everts' No. 1 J. A. Smith, dry and abandoned, total depth 3,260 feet.

Henderson County

E. L. Chapman's No. 1 Cade, dry and abandoned, total depth 3,199 feet.

Polk County

Sunshine Oil Co.'s No. 1 McDuffy, abandoned location. Same company's No. 3 A. Palmetier, show oil in sand at 3,312-15 feet, show oil 3,381-91 feet, dry and abandoned 4,153 feet.

Van Zandt County

Texas Chief Oil Co.'s No. 1 W. P. Foster, dry and abandoned, total depth 2,464 ft. Pure Oil Co.'s No. 1 H. P. Tunnell, initial production 95 bbls., total depth 2,957 feet. Same company's No. 1 B. E. Crim, initial production 110 bbls., total depth 2,925 feet. Same company's No. 1 A. R. Humphreys, initial production 95 bbls., total depth 2,947 feet. Same company's No. 1 J. R. Petty, initial production 153 bbls., total depth 2,960 feet. The Texas Company's No. 2 Carter, top Woodbine sand 2,961 feet, plugged back to 3,009 feet, dry and abandoned, total depth 3,039 feet. Shell Pe-

troleum Corp.'s No. 1 Taylor, initial production 110 bbls. first three hours through choke to 100 bbls. per day, eleven-sixteenths-inch choke, total depth 2,950 feet.

VAN POOL PRORATION
Effective September 16

Lease—	No. acres	Well No.	Allow. runs
Bolin (51)	2.13	1	100
		2	135
		3	133
Bracken (35)	70.80	1	541
		2	511
Bracken (503)	40	1	540
Brawner (10)	148.3	1	100
Cannon (64)	27.2	1	112
		2	100
		3	249
Church Lot (50)	1.67	1	138
Clark (63)	63.3	1	100
		2	177
		3	100
		4	120
		5	217
Clark (65)	94.3	1	100
		2	194
		3	102
Clark (74)	12.9	1	155
Clark (700)	2.42	1	173
Collett (57)	.95	1	132
Consolidation (79)	1.92	1	105
		2	102
Crim (28)	87.9	1	30
Crumbie (32)	24	1	561
Ellison (67)	80.5	1	100
Fowler (301)	3	1	148
Fowler (302)	71.8	1	280
		2	308
		3	132
		4	148
		5	141
		6	349
Fowler (302)	21.3	1	531
Freeman (208)	31.4	1	75
Howell (45)	59.2	1	278
		2	290
Jarman (37)	134.4	1	307
		2	456
		3	526
		4	247
		5	311
Leonard (30)	47.5	1	112
		2	40
Magers (18)	73.2	1	127
Maxfield (38)	106	1	581
Miller (17)	5.3	1	147
Miller (34)	60	1	399
Morris (62)	78.2	1	230
Morris (601)	2.2	1	132
Murphree (31)	79.9	1	501
		2	488
		3	461
Neills (66)	100	1	100
Peters (29)	71.7	1	127
		2	80
School Lot (60)	5.2	1	290
Shivers (13)	46	1	561
Stewart (48)	15.03	1	332
		2	132
Swain (14)	51.6	1	15
Swain (36)	32.1	1	444
Thompson (49)	50.7	2	275
		3	135
		4	143
		5	242
		6	100
		7	268
		8	103
Thompson (401)	63.3	1	438
		2	484
		3	435
Tunnell (52)	.28	1	100
Tunnell (56)	4.23	1	100
		2	140
Tunnell (59)	97.8	1	301
		2	309
Tunnell (300)	46.3	1	195
		2	207
		3	307
		4	147
		5	145
		6	148
Tunnell (505)	6.25	1	100
Tunnell (506)	101.7	1	157
Wallace (402)	37	1	548
R. L. Wells (46)	40.1	1	273
R. L. Wells (47)	91.6	1	289
		2	251
		3	100
		4	266
		6	134
		7	234
		8	135
		9	135
White (61)	45	1	184
White (500)	33.7	1	546
White (501)	34	1	426
White (502)	25.1	1	455
White (504)	20.4	1	576
Carroll (Humble)	98.8	1	447
Carter (Texas)	171	1	412
McMahon (Cure)	48	1	232
Ruth Star Blake (Humble)	201.4	1	510
		2	282
Sanger Bros.	8.46	1	213
York (Pure)	39.6	1	587
Total			27,521

EAST CENTRAL TEXAS WILDCATS

Week Ending September 20

DELTA COUNTY

Keane-Goldman et al, one-half mile N of Cooper ..... Drlg. 3,315 ft.

FANNIN COUNTY

North American Pet. Co.'s No. 1 Allen, 700 ft. N and 150 ft. W in N. R. Broadfoot Sur., 9 miles N of Honeygrove ..... Shut down 1,400 ft.

E. M. Rogers' No. 1 McSwain, 300 ft. S and E of Michael Daly Sur., in Juana Telgando Sur., 1½ miles NE of Lomasco ..... Shut down 1,500 ft.

GREGG COUNTY

M. S. Hammond's No. 1 J. M. Hamby, 278 ft. from E line, 1,667 ft. S of Hamby 3,200-ac. tract, Martin Lant Sur. ..... Moving in rig.

HENDERSON COUNTY

H. E. Ashburn et al's No. 1 T. E. Barry, center of Barry's 59-ac. tract in A. York Sur. ..... Top Pecan Gap 3,810 ft.; drlg. 2,840 ft.

L. G. Bradstreet's No. 1 Julia J. Shaunessy, 2,776 ft. from N and 300 ft. from W of survey or farm, John Isard Sur. ..... Top Woodbine sand 4,381 ft.; drlg. 4,404 ft.

E. L. Chapman's No. 1 Cade, 1,662 ft. from N and 2,694 ft. from W, 600 ft. W of No. 1, J. B. Dorsey Sur. ..... Location.

George Pace et al's No. 1 Mrs. Sarah Anthony, 272 ft. N and 132 ft. W of SE cor. of S. Anthony 632-ac. tract, Jose W. Battvan Sur. ..... Drlg. 2,820 ft.

Texas State Oil Co. et al's No. 1 Skinner, 200 ft. N and 150 ft. E in J. Hinshaw Sur. ..... Location.

HUNT COUNTY

Branson et al's No. 1 West, 350 ft. N, 350 ft. W of W 60-ac. tract, Jas. Rooces Sur. ..... Shut down 3,250 ft.

Mamie S. Hammond's No. 1 W. H. Adams, center of survey, west of Branson Sur., J. A. McFarland Sur. .... Location.

KAUFMAN COUNTY

Shaw & Alexander's No. 1 Barrow, 2,360 ft. S and 200 ft. W of R. A. Terrell Sur., 4½ miles N of McCoy. ..... Shut down 3,247 ft.

LAMAR COUNTY

Everett & Allen's No. 1 Guest, 250 ft. S and 2,046 ft. E of 100-ac. tract, L. Roberts Sur. ..... Spudded and shut down.

NAVARRO COUNTY

Young et al's No. 1 Farmer, 700 ft. from S and 400 ft. from E of 110-ac. farm in F. Finley Sur. ..... Shut down 960 ft.

RAINS COUNTY

Everett & Morrison's No. 1 Franklin, 640 ft. from S and E of 75-ac. tract in John Christian Sur., 6 miles SE of Emory ..... Spudded and shut down.

RUSK COUNTY

Clem S. Clark's No. 1 Maude R. McCafflin, 427 ft. from N, 166 ft. from W of farm, Ellie Blackburn Sur. .... Show oil 2,688-2,703 ft.; will run 8¼-in. csg.; total depth 2,714 ft.

C. M. Joiner's No. 3 Bradford, Juan Ximenes Sur. ..... Cemented 25 sacks cement; total depth 3,592 ft.

Mass et al's No. 1 Matthews, 3,244 ft. from N, 4,356 ft. from E, Dalines Cartinas Sur. ..... Derrick down.

Rosenfield's No. 1 L. A. Pinskton, 150 ft. from N and 262 ft. from W of Pinkston 77-ac. tract, Maria V. Pena Sur. ..... Derrick.

SMITH COUNTY

Owens & Sloan Oil Co.'s No. 1 Stearns, 846 ft. along W lines of John Waller Sur. from NE cor. of J. O. Dillard Sur., and 80 ft. E at right angles to W line of J. Waller Sur. ..... Shut down 3,002 ft.

Sun Oil Co.'s No. 1 D. McGehee, 500 ft. W and 250 ft. S of SW cor. of Mrs. Julia Phillips 55-ac. tract, Thomas Quevado Sur. ..... Drlg. 718 ft.

Thayer & Rogers' No. 1 Willingham, 150 ft. N and W of 14.5-ac. tract, Jacob Hernin Sur. ..... Drlg. 1,100 ft.

Winona O. & G. Co.'s No. 1 Freeman, 150 ft. from S, W of 89-ac. tract in A. J. Legrone Sur., 4 miles SE of Winona ..... Drill stem loose; will drill deeper; total depth 3,525 ft.

VAN ZANDT COUNTY

Anderson et al's No. 1 York, 65 ft. from E and 150 ft. from S of excess strip, offset to SW cor. Shell Pet. Corp.'s Taylor lease, John Walling Sur. ..... Drlg. 1,800 ft.

L. R. Barton's No. 1 Wamble, 300 ft. from S and W of 100-ac. tract in Pleasant Young Sur. ..... Drlg. 1,800 ft.

Broderick & Calvert's No. 1 M. F. Shirley, 150 ft. from W in C of N and S lines of 2.1-ac. strip, John Walling Sur. ..... Drlg. 2,932; oil sand; top sand 2,765 ft.

D. H. Byrd's No. 1 W. H. Mawes, 150 ft. from S and 150 ft. from W. J. Piles Sur. ..... Drlg. 2,720 ft.

E. L. Chapman's No. 1 Charles Wolverton, 215 ft. from N, 60 ft. S of NE cor. of Wolverton 10-ac. tract, William James Sur. ..... Cored shale 3,800 ft.

Cranfill & Germany's No. 1 Swain, 127 ft. N and 50 ft. from W of excess strip on W side of O. L. and L. L. Swain farm ..... Shut down 14 ft.

T. Daniels' No. 1 Fannie Cumbine, 185 ft. S and 175 ft. E of NW cor. 156-ac. tract, John Wright Sur. ..... Shut down 2,275 ft.

Dennis Oil Co.'s No. 1 C. W. Morris, 100 ft. from N and 300 ft. from E lines of Morris 160-ac. tract in C. L. Morris Sur., 5 miles SE of Ben Wheeler ..... T. D. 3,071 ft.; will abandon.

Hartt Oil Co.'s No. 1 Dr. L. M. Cox and A. C. Night Sur., 1,785 ft. N of S line and 524 ft. E of W line .... Derrick.

Hartt Oil Co.'s No. 1 O. L. and L. L. Swain 2.3-ac. tract, 150 ft. E and 104 ft. N, John Walling Sur. ... Rigging up.

H. Helms et al's No. 1 Bogue, 647 ft. W and 155 ft. S of SE cor. of J. M. Brown 70-ac. in Marshall University Sur., SE of Van ..... Drlg. 1,648 ft.

B. P. Hervey's No. 1 Foster & Smith, 150 ft. S and 150 ft. W of 104-ac. tract, Margaret Neal Sur. ..... Fishing 4,601 ft.

Howard & Dooley's No. 1 Elliott 188-ac. tract in W. H. Bundy Sur. ..... Derrick.

Humble Oil & Ref. Co.'s No. 2 Carroll, 750 ft. W of E line and 250 ft. N of S line of Carroll 988-ac. tract, William Daniel Sur. ..... Set 10-in. 354 ft.

Humble Oil & Ref. Co.'s No. 1 L. A. Dowdle, 1,027 ft. N of S line and 150 ft. E of W line, William Daniel Sur. .. Coring 2,983 ft.

Humble Oil & Ref. Co.'s No. 4 Blake, 735 ft. W of most NE line and 250 ft. S of N line of Blake 2,014-ac. tract, John Walling Sur. ..... Rigging up.

Imperator Oil Co.'s No. 1 G. J. Luther, in SW cor. G. J. Luther 32-ac. tract ..... Shut down 2,660 ft.

Imperator Oil Co.'s No. 2 G. W. Carter, 175 ft. from S and 35 ft. from W of G. W. Carter 171-ac. tract, William Daniel Sur. ..... Shut down.

Jenkins et al's No. 1 V. T. Davis, SE cor. of 139.8-ac. tract, Nacogdoches County School Land ..... Swab 12⅛ hrs., 2½-in. tubing; small show oil; shut down 3,021 ft.

Kraft & Kelsey's No. 1 Enas in Vacancy strip on E side of Sam Allen and Wylie Enas farms in J. Prado Sur.. Shut down 1,390 ft.

T. W. Moore's No. 1 Kellam, C of 52-ac. farm in Jesse Russell Sur. ..... Location.

Priest et al's No. 1 Blewitt, 175 ft. NW and SW of SE cor. of NW 84-ac. tract, E. Porter Sur. ..... Drlg. 3,015 ft.

Pure Oil Co.'s No. 1 A. D. Clark, 200 ft. S of N line and 150 ft. W of E line, Mund Gross Sur. ..... Swabbing; were unable to make flow.

Pure Oil Co.'s No. 1 Neills, 250 ft. from N and 200 ft. W of 86-ac. tract, John Walling Sur. ..... Drlg. 2,540 ft.

Pure Oil Co.'s No. 1 Swain, 93 ft. N and 150 ft. E of 43-ac. tract, Walling Sur. ..... Drlg. 1,788 ft.

Pure Oil Co.'s No. 1 A. D. Clark, 672 ft. S and N line and 217 ft. E of W line, A. H. Wiley Sur. ..... Cement setting 3,585 ft.

Pure Oil Co.'s No. 1 Mrs. W. A. York, 650 ft. S of N line and 225 ft. E of W line, John Walling Sur. .... Ready to swab in 2,914 ft.

Pure Oil Co.'s No. 1 Davis, 127 ft. from S and 200 ft. from W of 139-ac. tract, Nacogdoches County School Land ..... Derrick standing.

Pure Oil Co.'s No. 1 D. O. Mayo, 225 ft. E of W line and 200 ft. S of N line of 295 acres, J. Prado Sur.... Location.

Shell Pet. Corp.'s No. 2 Taylor, 150 ft. from N and 139 ft. from E of 30-ac. farm ..... Rigging up.

Shell Pet. Corp.'s No. 3 Taylor, 150 ft. from S and 65 ft. W of 30-ac. farm ..... Rigging up.

Vitek Oil Co.'s No. 1 Smith, 150 ft. S and 15 ft. from W of L. A. Smith 40-ac. farm in John Walling Sur. .. Derrick.

WOOD COUNTY

Big Indian Oil Co.'s No. 1 R. J. King, 450 ft. W of E line and 150 ft. N of S line of King's 100-ac. tract in Wm. Barnhill Sur. ..... Cleaning out 4,569 ft.

Loche & Clark's No. 1 A. C. Pick, 165 ft. S of NE cor. G. C. Reeves 25-ac. tract, Daniel Fuller Sur. .... Shut down 997 ft.

JACKSON FIELD EXTENDED 2 MILES EAST AND NORTH OF PRODUCTION

By Special Correspondent

JACKSON, Miss., Sept. 27.—Completion of a trio of producing wells in the Jackson Field and renewal of activity in the Amory area, in the northern part of the State, have been outstanding developments in Mississippi during the past 10 days.

The 2-mile extension of the Jackson gas field east and north of the nearest producers was made by Gulf Refining Co.'s No. 1 Crane in the NE NE, Section 26-6-1e, Hinds County, which had an estimated 15,000,000 feet of gas at 1,080 pounds from 2,457 feet. The nearest wells are in Section 28-6-8e and Section 2-5-1e. The same company's No. 1 City of Jackson in Section 10-5-1e made an estimated 30,000,000 feet of gas at 1,080 pounds, total depth 2,460 feet. Love Petroleum Co.'s No. 1 Crisler, NW SW, Section 2-5-1e, was estimated at 500,000,000 feet of gas with lots of salt water from 2,485 feet, with top of the chalk at 2,468 feet.

Across Pearl River from Jackson, in Section 12-5-1e, Rankin County, Pearl River Oil & Gas Co.'s No. 1 Pate in the SE SE of the section made an estimated 50,000,000 feet of gas from 2,418 feet, 5 feet in the chalk, and is about as good a well as has been completed in the field. Jackson Oil & Gas Co.'s No. 2 Mays, SE NE, Section 2-5-1e, was abandoned at 2,737 feet as a dry hole. Location is in the midst of a group of gas wells. Interior Oil Co.'s location for No. 1 Belhaven Heights in the NE NE, Section 2-5-1e, will not be drilled. Cleve Love's No. 1 Ridgeway-McGee, NW SW, Section 2-5-1e, topped the chalk at 2,466 feet, but bailed dry with a little salt water at 2,488 feet and will go deeper. Ohio Oil Co. apparently is planning to make No. 1 Cantrell, NE NE, Section 16-15-5, Clay County, a real deep test, setting 18⅝-inch at 80 feet as surface string. The well is on a block of 35,000 acres favorably reported on after magnetometer surveys and core drilling.

Coincident with these completions in the Jackson Field, the Gulf Refining Co. announced one new location in Section 4-5n-2e, Rankin County, on the Julius Hamilton tract.

The Jackson Oil and Gas Co.'s No. 1 Mayes, Section 2-5n-1e, Hinds County, within the limits of the city of Jackson,

(Continued on Page 323)

Pipe Line Construction News

May Oil Pipe Line Transport Gasoline Pennsylvania Query

HARRISBURG, Pa., Sept. 15.—Although the law may prohibit the transportation through a pipe line constructed under authority of an act of 1929 conferring the right of eminent domain upon companies incorporated to transport oil, no legal action can properly be instituted in a quo warranto proceeding until such company shall actually have transported gasoline, according to a ruling by the attorney general, Cyrus E. Woods.

No case has been brought to his attention, the attorney general said, where such proceedings were instituted in anticipation of an ultra vires act or of a violation of law by a corporation. He therefore declined to file an information as requested in a petition filed by a property owner in Chester County against the Susquehanna Pipe Line Co. The petition, however, was dismissed without prejudice to the petitioner's right to renew it if and when the company shall have begun to transport gasoline through the pipe line in question.

The ruling follows:

William S. Ellis, the owner of property in Chester County, on behalf of himself and other property owners, on July 21, 1930, filed a petition requesting the attorney general to file in the court of common pleas of Dauphin County an information in quo warranto against the Susquehanna Pipe Line Co.

The petition alleged that the pipe line company was chartered by the commonwealth on March 28, 1930, for the purpose of "transporting * * * petroleum and refined petroleum products, and to construct, maintain and operate such pipe lines, tanks and facilities as are necessary and proper for the conduct of said business * * *"; that the corporation has asserted the right of eminent domain conferred by the act of April 30, 1929, P. L. 896, upon companies incorporated "for the purpose of the transportation and storage of oil by means of pipe lines and tanks"; that the corporation intends to transport gasoline through the pipe line now being constructed; and that it does not have the power to take land under the Act of 1929 for the purpose of constructing a pipe line for the transportation of gasoline.

A copy of the petition was served upon the pipe line company and it filed an answer in which it conceded that there is a legal question whether gasoline may lawfully be transported through a pipe line constructed as the result of the exercise of the powers conferred by the act of 1929; but it averred that a petition asking the attorney general to file an information in quo warranto is premature because as yet the pipe line company has not completed the construction of its line, and has not, therefore, transported gasoline or any other product through the line. It takes the position that quo warranto proceedings can be instituted only after an alleged violation of law has occurred, and can not, like a bill in equity, be filed to restrain a threatened transgression of the law.

We are disposed to agree with the position taken by the respondent company.

Quo warranto proceedings are purely a statutory remedy. The statute under which they may be instituted is the act of June 14, 1836, P. L. 621. Section 3 of this act provides that:

"Whenever the attorney general shall have reason to believe that any * * * corporation has * * * exercised any power, privilege or franchise not granted or appertaining to such corporation, it shall be his duty to file, or cause to be filed, a suggestion * * * and to proceed thereon for the determination of the matter."

There are many cases in this State in which quo warranto proceedings have been instituted if the corporation has, in the opinion of the attorney general, acted beyond its powers or contrary to law, but no case has been brought to our attention in which the attorney general has instituted such proceedings in anticipation of an ultra vires act or of a violation of law by a corporation. Indeed, it seems to us that the legislature has made it clear in section 3 of the act of 1836 that quo warranto may issue only in cases in which the respondent corporation has already committed the act which forms the basis of the information.

For this reason we dismiss the petition and decline to file an information as requested therein, without prejudice, however, to the petitioner's right to renew his application if and when the respondent company shall have begun to transport gasoline through the pipe line in question.

SINCLAIR CONTRACT TO YOUNGSTOWN TUBE

By B. E. V. Luty

PITTSBURGH, Pa., Sept. 29.—The Sinclair Consolidated Oil Co. has placed an order with the Youngstown Sheet & Tube Co. for 12-inch seamless tubing for an oil line, the quantity being 150 to 175 miles. This is heavy tubing, running 49½ pounds per foot or about 130 net tons per mile, the total quantity being 20,000 tons or more.

Line pipe producers expect to be kept busy most of the time for more than a year. At present makers are booked for nearly if not quite two months ahead on sizes 8 or 10-inch and upward.

LINE TO PENSACOLA HAS PECULIAR RISKS

The construction of the Pensacola division of the Southern Natural Gas Corp. is expected to begin early in October. The line will be 67 miles long, reaching from Mobile to Pensacola. The line will traverse about 14 miles of swamp beginning at a point approximately 1½ miles west of the L.&N.R.R. crossing at Bayou Sara. This swamp, which is almost impenetrable, swarms with alligators and reptiles.

The swamp begins abruptly. The terrain changes almost without warning from sandy clay to river silt, which lies about 20 feet deep above the sand. Trees, brush, decayed vegetable matter and grass almost as strong as whipcord form a mat which floats on top of the river silt. From the very point of beginning up to Bayou Sara there is a succession of small streams, ponds and bogs. The timber is extremely dense, surveyors having found it impossible to progress except after advance crews had traversed the right of way and cut a path for those following behind. The timber consists of cypress, Tupelo gum and oak. The line will follow the L.&N. right of way across the swamp to the east side of the Tensas River at a distance of approximately 105 feet north of central line. The level of the swamp is about 1 foot above the ordinary level of the water in the bayous and river. At this time the Natural Gas Engineering Corp., which will have charge of the construction, believes it will be unnecessary to bury the pipe across the swamp. Instead, a double line will be laid and a regular river clamp will be used at each joint to hold the pipe in place and to prevent the river currents, during high water, displacing or breaking the line. In order to thoroughly safeguard the city of Pensacola and surrounding territory, there will be four stream crossings of multiple lines where the 12-inch line will be broken down into 6-inch pipe, one at Bayou Sara, one at Canot Creek, one at the Mobile River about 900 feet long and one at the Tensas River about 3,000 feet long.

The task of the Natural Gas Engineering Corp. will be made more difficult by reason of the fact that in the swamp it will be impossible to use machinery such as is usually utilized in pipe line construction. Another difficulty will be in distributing the pipe along the right of way, and it is expected that either brush mats or planks will be provided at points along the right of way for the men to work on and to keep them from sinking in the soft mush. It is expected that this construction will be the first where it will be found necessary to provide house boats for the crews to live in while engaged in this perilous task of carrying natural gas to the Florida peninsula. No camp site will be available for several miles and provision will be made to house the men on the surface of the water.

Natural Gas Engineering Corp. announces that the first work to be done of the 67 miles will be that of negotiating this crossing. The remainder of the work is not looked upon as being out of the ordinary run of pipe line construction. Unless unforeseen difficulties are encountered, natural gas will be provided the local gas company for distribution in Pensacola by December 1, and it will also be available for use in industries operating nearby.

Laying Natural Gas Line in Louisiana

CONTINENTAL CONTRACT LET FOR 113 MILES

Contracts for the construction of 113 miles of 24-inch high-pressure natural gas pipe line have been awarded by the Continental Construction Corp. to Henry Lemons, Inc., of Tulsa, it is announced by Henry L. Doherty & Co.

Starting from a point near Plattsmouth, Neb., on the east bank of the Missouri River and running eastward into Iowa, this is a part of the Texas-Chicago pipe line being built by Cities Service, Insull interests, Southwestern Development Co., Standard of New Jersey, The Texas Corporation, Skelly Oil, Phillips Petroleum and Columbia Carbon Co., to serve Chicago and the Great Lakes region. Four sections of this line extending from the Texas Panhandle to the west bank of the Missouri are already under construction.

Contracts for the Missouri River crossing, which will consist of ten 10-inch lines, to be connected with the main trunk line on both sides of the Missouri, have been let to Smith Brothers of Dallas, Tex.

This crossing is to be dredged in to a depth of 4 feet below the normal river bed, in compliance with a United States Government regulation, and is also anchored with specially designed anchors to prevent drifting and damage of high water at flood stages.

Deliveries of 24-inch steel pipe are reported at 55 material receiving depots located in five states. Construction camps and warehouses have been completed to accommodate men and machinery used in welding and laying the line, while all activities are meeting accomplishment schedules.

PROPOSED LINE TO SPOKANE

CASPER, Wyo., Sept. 27.—Another gas line project is to start in the spring from the Cut Bank gas field in Glacier County. This line is proposed to carry gas from the field to Spokane, Wash.

Bitumastic Enamel makes a hard, smooth coating with the appearance of black glazed porcelain.
Note the substantial thickness of *Bitumastic Enamel.* It is 1/16th in. thick.
Priming coat of *Bitumastic Solution* which bonds the *Enamel* firmly to the pipe.

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Forms a *Thick*, Tough Tenacious Armor

UNLESS a protective coating is of substantial thickness it cannot provide dependable pipe line protection. Pin holes, hair line cracks and other imperfections are very apt to occur in thin coatings. Abrasion during handling operations is almost sure to scuff them, exposing bare metal.

Bitumastic Enamel makes a coating 1/16th in. thick, sufficiently hard and thick to withstand rough handling. It is sufficiently tough to prevent cracks and pin holes and so tenacious that it sticks tightly to the metal unless forcibly knocked off.

Bitumastic Enamel has not been used to protect *all* the big lines laid in recent years.

But it has been used on *most* of them, either wholly or in part—

And where in part, invariably on those sections where corrosive conditions were adjudged most severe.

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Philadelphia Cleveland Chicago Houston Los Angeles San Francisco

Somerset County Well Holds Attention

Southwest Pennsylvania Test Awaiting Outcome of Other Tests. West Virginia Lessens Curtailment

By Special Correspondent

PITTSBURGH, Pa., Sept. 29.—In Southwest Pennsylvania, interest is being shown in the American Natural Gas Co. well in Quemahoning Township, Somerset County, which is at present shut in waiting on tests of other wells drilling. About 25 years ago a group of men combined to drill a well on the same farm as the present well, and on the farm now owned by O. S. Miller. This farm is about 3½ miles west and north of Friedens, located on the Stoyeston-Somerset Road. The old well struck considerable gas at about 2,600 feet but the well was drilled deeper in search of oil, gas having little commercial value at the time. When the well reached a depth said to have been 4,000 feet, salt water was encountered which flooded the well and after a short time packed it off. Other wells were drilled with no success.

Recently two wells were drilled to the south and west of the gasser brought in, the Charles Mull farm test was drilled to a depth of 1,400 feet and abandoned, and that on the John Moore farm, also abandoned. These lie about 2 miles south of Ralphton. At present there are two others drilling, one on the Emert farm, 4 miles northeast of Somerset, and one-half mile south of Gideon, and one on the Royal Rhodes farm east of Ralphton. This latter well has reached 2,300 feet.

This region has long been condemned by geologists and considered unproductive. As to structural location, the gas well on the Miller farm lies on the west flank of the Negro Mountain anticline, three-quarters of a mile southeast of the center of the trough of the Somerset syncline and about 4¼ miles northwest of the crest of the above anticline.

An indication of the return to better conditions in the Eastern oil fields was the recent decision of the producers in West Virginia that a decrease in curtailment could be made without hampering economic conditions, and it was so ordered effective September 19. During the past week, there were 28 reports of completions, 12 oil wells, 12 gas wells, and 4 dry holes. The total new initial production was 363 bbls.

SOUTHEAST OHIO

Southeast Ohio reported the largest producers, the best for the week being Ralph Norpell and others' No. 2 on the William D. Booth farm, Section 13, Fallsbury Township, Licking County. It was drilled to the Clinton sand at a depth of 3,041 feet, and after shot produced 116 bbls. the first day. Another fair well was the completion of the test on the Chris Lauer farm by Bay and Keppler and in Salem Township, Washington County. It reached the Buell sand at 335 feet and flowed 50 bbls. the first day natural. This well has not been given a thorough test but it is looking good for a 100-bbl. pumper. In Belmont County, W. C. McBride, Inc., completed a very fair gas well on the Bement and Howell farm, its No. 3. It was drilled to the Keener sand, 1,396 feet, and is rated at 1,000,000 feet a day.

In Athens County, Park Bowers and others completed their No. 3 on the Fred R. Cooley farm, near Albany, Section 20, Alexander Township, in the Berea grit at 1,366 feet, and it is a gas well estimated at 200,000 feet a day. In Lot 40, Bethlehem Township, Coshocton County, O. E. Sloan and others completed their No. 14 on the Adams and Mayers farm in the Berea sand at 1,050 feet. It will make a 5-bbl. pumper.

Licking County had two other completions. In Section 23, Mary Ann Township, William Stricker and others completed No. 3 on the William Stricker farm in the Berea sand. It made 7 bbls. the first day after shot and is estimated as a 2½-bbl. pumper. In the same township, but Lot 3, O. H. Griffith drilled a test on the David Wright farm also to the Berea sand, which after shot made 10 bbls. initial, and will probably settle down to a 2-bbl. pumper.

In the shallow sands of Medina County, the Oko Oil & Gas Co. brought in another fair well. It was its No. 42 and drilled on the Henry Essig farm, Lot 2, Section 13, Chatham Township. It reached the Cow Run sand at 460 feet and made 30 bbls. the first 24 hours after shot.

In Muskingum County, the Hopewell Fuel & Gas Co. completed a test on the O. M. Perry farm, Licking Township, Section 6. It was drilled in the Clinton sand, 3,226 feet, and made 60 bbls. the first day after shot. In the same county, and in the SW, Section 3, Clay Township, Waldsmith and Webb drilled a test on the Bruce Baughman farm in the Clinton sand at a depth of 3,156 feet. It is estimated good for a 5-bbl. pumper after shot.

The Preston Oil Co. completed its test on the William and C. W. Larne farm, Section 18, Reading Township, Perry County. It reached the Clinton sand at 2,860 feet and is dry. In Washington County, John C. Grau completed his No. 6 on the Henry Steinhoff farm, on Reas Run, Section 8, Independence Township. It was drilled to a total depth of 1,450 feet, the third Streak Salt sand, and made 5 bbls. the first day natural, which, after shot, increased to 10 bbls. the second 24 hours.

Drilling in Ohio

In Section 19, Carthage Township, Athens County, the Orange Oil & Gas Co. has reached 700 feet in a test on the S. K. Coen farm. In Section 18 of the same township, the Ohio Fuel Gas Co. is down to 800 feet in a second test on the B. A. Barnhill farm. Kachelmacher estate is drilling at 2,200 feet its test on the Charles W. Wilson farm, Section 4, Trimble Township. In York Township, Section 24, the Ohio Fuel Supply Co. has reached 1,800 feet in a test on the Sunday Creek Coal Co. tract.

In Coshocton County the Preston Oil Co. is approaching the sand in the test on the F. H. Donaker farm, Section 16, Perry Township, and is drilling at 3,100 feet. In Section 14 of the same township, the same company has spudded in and started drilling its second well on the Elmer Clark farm. In Jefferson County there are five tests drilling. Elliott & Co. are down to 300 feet on the W. Swartz farm, Section 28, Island Creek Township. C. M. Stratton has reached the sand and is testing the oil in his test on his own property in Section 17 of the same township. Again in this township, William Graham & Co. are also in the sand with a showing of oil, and testing, in their No. 1 on the O. S. Dennis farm, Section 22. In Section 22, Island Creek Township, Lee & Co. have reached 1,200 feet on the J. D. Sinclair farm. Brown, Vorhees and others are drilling at 1,100 feet on the Dorrance heirs farm, Springfield Township, Jefferson County.

In Knox County the Preston Oil Co. has a rig up on the A. J. Beatty farm, Section 2, Jackson Township. In Licking County, the Murphy Petroleum Co. and others have reached 1,500 feet on the Albert Johnson farm, Section 13, Fallsbury township. In the same section the Emerald Petroleum Co. and others are down to 1,875 feet in their No. 2 on the Wilbur Babcock farm. Beabout and others have spudded in and started drilling on the Amos Van Winkle farm in the same section. McClay, Borthers and others are approaching the sand in their No. 2 on the U. G. Porter farm, Section 13. In Lot 19, Hopewell Township, the Preston Oil Co. has a depth of 2,900 feet in No. 1 on the Margaret Robinson farm.

In Holmes County the Ohio Fuel Gas Co. has reached 3,450 feet in its second test on the Valentine Close farm, Section 13, Monroe Township, and in Washington Township, Section 12, is drilling on the A. H. Campbell farm.

WEST VIRGINIA

There were few oil wells completed in West Virginia during the past week and none of any size. Athey Brothers completed the largest, located on the Susan Athey farm, Williams district, Wood County, their No. 2. It was drilled to the Salt sand at 1,278 feet and is estimated good for 7 bbls. a day. In Sherman district, Calhoun County, L. P. Bickel completed his No. 12 on the S. T. Stump farm; it was drilled in the Salt sand and is good for 5 bbls. a day.

The Gilco Gas Co. completed a test on the J. W. Snider farm, Troy district, Gilmer County, at a depth of 2,363 feet, and in the Big Injun sand. It is estimated as a 5-bbl. pumper.

Gas Wells

In Boone County, Godfrey L. Cabot and others completed a light gas well in No. 28 on the Federal Coal Co. tract, Sherman district. In Calhoun County, the South Eastern Gas Co. has a fair gasser on the Robert Wilson farm, Center district. It was completed in the Big Injun sand at a depth of 2,130 feet.

In Troy district, Gilmer County, the Mud Lick Oil & Gas Co. completed a very fair well, rating over 1,000,000 feet, on the T. M. Lynch farm. It was drilled to the Big Injun sand at 1,722 feet. In Lewis County, the Moran Drilling Co. completed a test on the G. W. Allman farm, Collins Settlement district, to the 30-foot sand, at 2,900 feet, and it is showing for a fair gasser. In Lincoln County the Woodyal Gas Co. drilled its No. 2 on the R. L. Stowers farm, Union district, to a depth of 2,485 feet and has a gas well estimated good for 300,000 feet. In Paw Paw district, Marion County, the Owens Illinois Glass Co. completed a light gas well on the Lernie Toothman farm, and in the same district Victor Tennant completed his test on the Minnie S. Price farm in the Big Injun sand, depth 1,665 feet, and it is a fair gas well.

In Pleasants County, Hinds Peevey abandoned his test on the Perlie Reed farm at 925 feet, there being no show at all. This is in McKim district. In Spencer district, Roane County, the Ohio Valley Oil & Gas Corp. has a 500,000-foot gas well on the Ray Taylor farm. The gas was reached in the Big Injun sand. F. F. McIntosh and others completed No. 1 on the J. C. Starcher farm, Smithfield district, Roane County, at a depth of 1,755 feet, and it is dry.

Drilling in West Virginia

In Malden district, Kanawha County, the Ten Mile Oil & Gas Co. has about reached the sand in its No. 11 on the H. C. Dickinson farm. In the same district, Godfrey L. Cabot has a rig up for his No. 5 on the William P. Tompkins farm. The Owens Bottle Co. has a rig ready and part of the tools hauled in for a well on the C. Q. Crockett farm in Malden district. In Cabin Creek district the Pure Oil Co. has rigs ready and materials on hand for its No. 254 and 255 on the Williams Coal Co. property. The Cannelton Coal Co. has reached 2,300 feet in its No. 14 on its own tract in Cabin Creek district. It has locations ready for three additional wells. In the same district, Godfrey L. Cabot is down to 1,660 feet

(Continued on Page 160)

RECORDS OF ST. PETER SAND WELLS INTEREST TENNESSEE OPERATORS

By George A. Whitney
Staff Correspondent, Kentucky-Tennessee

McMINNVILLE, Tenn., Sept. 29.—The most interesting development of the week was the discovery of the records of two more deep wells drilled three or four years ago to the St. Peter sand. One was in the famous Tinsley Bottom Pool and resulted from the deepening of No. 5 Linn to 1,312 feet where some 7 or 8 feet of rich brown sand showing both oil and gas through 1,000 feet of water indicated the drillers were just about to break into something worth while. Tradition says the contractor urged the owners to run in a small string of casing and save the well, but that they refused because of the extra expense and it now looks as if they had let a few hundred dollars stand in the way of their making a fortune, for if they had demonstrated the lower sand was commercially productive quite a different outcome would have resulted from their first and last venture in the oil game. Samples of this sand have recently been microscopically examined and found to be the St. Peter sandstone.

Some 10 miles down the Cumberland River a well was drilled on the R. L. Meadows farm to a depth of 1,250 feet, starting below the black shale. An unusually good showing of gas and oil was found in this well and careful comparison of the sand found from 1,140 to 1,200 feet proves it to be the same sand as found in the other deep wells in that vicinity. Of the seven St. Peter sand wells drilled along the Cumberland River between Butlers Landing and Brooks Ferry only two were located on such a structure as a geologist would select for a deep well and those two wells were commercially productive. The regularity of the strata below the black shale and the presence of the various beds where they should be expected, renders the work of a geologist comparatively easy.

Tennessee is being invaded in increasing numbers by operators from other states, especially by those from Kentucky, and their scouts and lease men are roaming through several counties, particularly those along the Kentucky line. It is said several contracts for new wells have been let in the past few days and an extensive drilling campaign will likely be under way before winter.

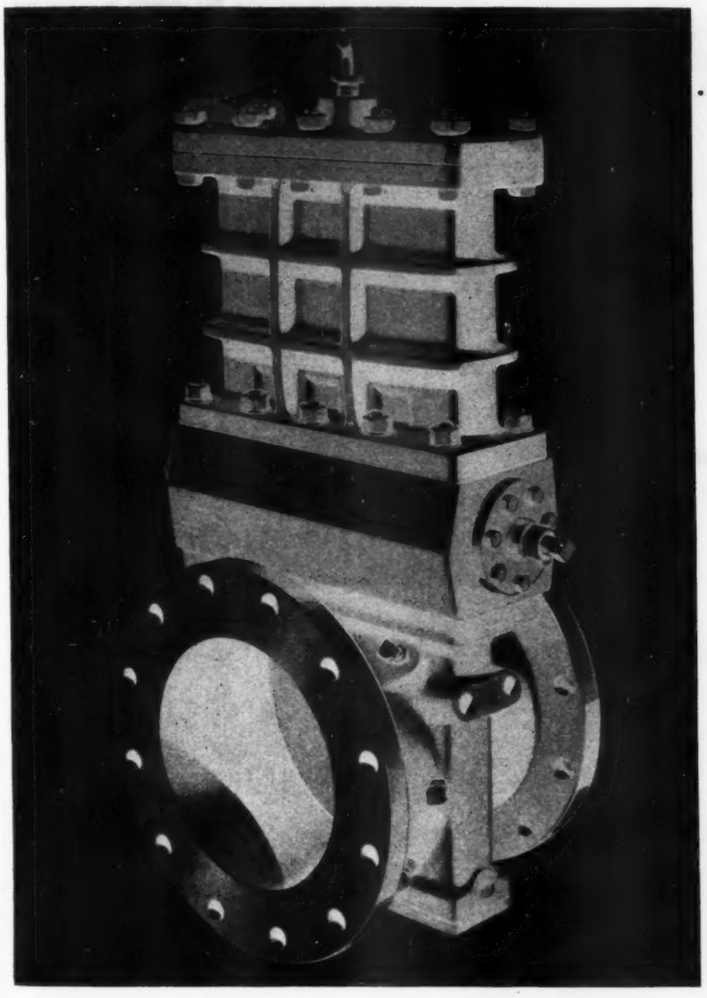
The Armistead Oil Co.'s holdings were inspected early in the week by President Armistead and three of his aids and the announcement was made that two new drilling rigs with full equipment had been purchased and several tests to the St. Peter sand would be made on their holdings around Lafayette and Spivey, where several tests are contracted to test out the St. Peter sand.

Overton County Test

In Overton County the deep test by the southeastern interests near Wilder is fishing at 1,800 feet. The Cumberland Oil Corp. of New York is shut down at 900 feet, or about 650 feet above the St. Peter sand, in No. 2 Garrett, in the western part of the same county. This well has a good showing of gas and oil and its owners are said to be prepared to drill it deeper and also drill tests in sev-

(Continued on Page 160)

IT'S EASY TO CHANGE PLATES • • • •



Robinson Standard Orifice Fitting. Made up to 16" size for 125 pound working pressure; 18" and larger for 100 pound working pressure. Orifice plate set screws made of stainless steel and may be packed under pressure. Has a force feed sealed lubricated taper plug.

One of the many advantages of the Robinson Orifice Fitting is the ease with which plates can be changed and replaced. Robinson has eliminated the old, costly method of extracting plates from between two flanges, thus permitting and encouraging frequent inspection and micrometer checking of the orifice diameter. Plates can be changed in from 3 to 15 minutes. This results in better metering because plates are so easily changed that there is no delay in adapting the meter to a different flow condition.

There are many other Robinson advantages. For example, the orifice is always centered — one reason for Robinson accuracy in metering. Gas cannot leak because there is no by-pass to stick open – another reason for Robinson accuracy in metering. The fitting occupies little space (no more space than an ordinary gate valve and ordinary pressure gauge, in fact) and can be mounted in practically any position. These, and additional Robinson advantages provide accurate metering at lowest cost.

Robinson Orifice Fittings are made in three types – Standard Semi-Steel, 125 Pound Working Pressure, 2" to 20"; Cast Steel, 500 Pound Working Pressure (300 Pound Steam Working Pressure), 2" to 20" and Cast Steel, 1000 Pound Working Pressure (600 Pound Steam Working Pressure), 2" to 8".

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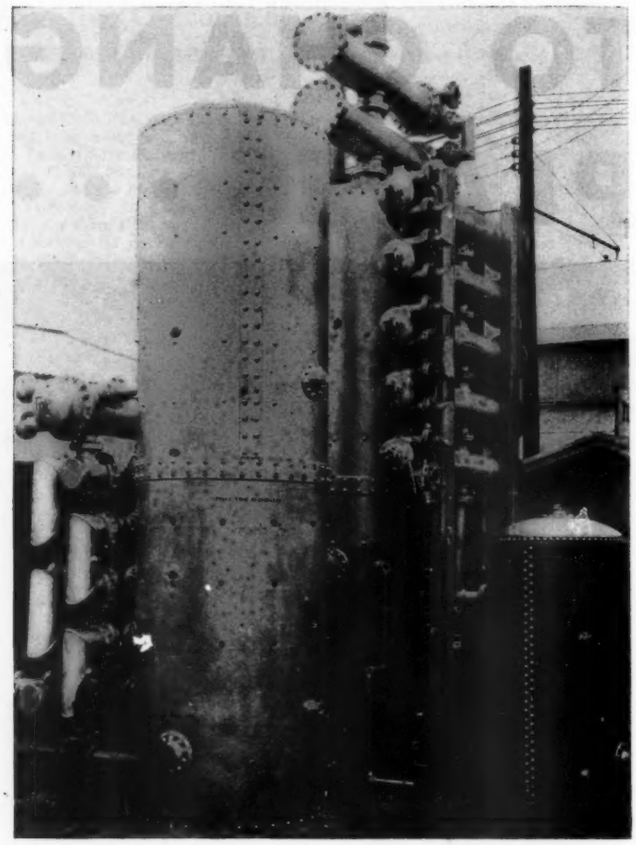

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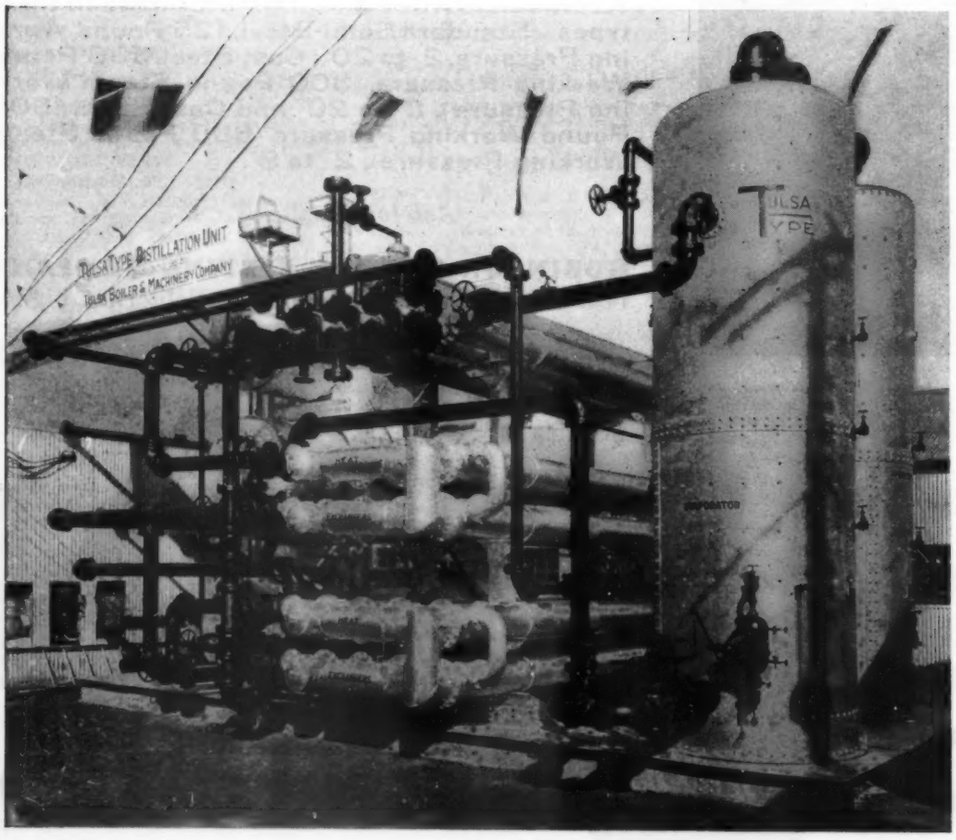

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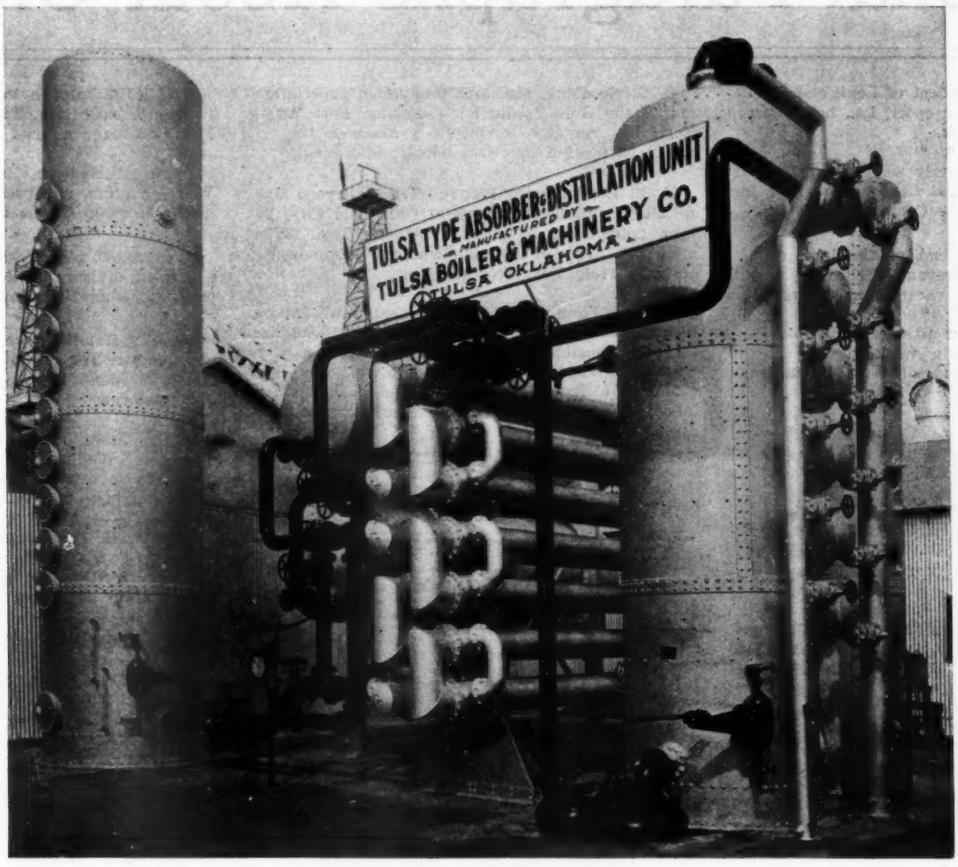


What IMPROVEMENTS will TULSA TYPE introduce to the Industry in 1930-1931

See Our Exhibit on Lot "L"

Tulsa Boiler & Machinery Co.

Tulsa, Oklahoma

Personal Paragraphs About Oil Men

M. J. Grogan, vice president of Louisiana Oil Refining Corporation of Shreveport, La., has returned from a week in New York.

* * *

A. H. Weisgerber, formerly secretary and treasurer of the Adian National Corporation, Ltd., has joined the Ajax Pipe Line Company, in Tulsa.

* * *

E. McCune, assistant head of the land department for the Sun Oil Company, Dallas, Tex., and Mrs. McCune spent their vacation in Colorado.

* * *

H. R. Cullen, Gulf Coast oil operator of Houston, Tex., has returned from a vacation trip, during which he and his family motored to the East and back.

* * *

Mills Bennett, president of the Mills Bennett Production Company, Houston, Tex., is spending three weeks in New York and other eastern points on business.

* * *

M. L. Cottingham, of Oklahoma City, Okla., president of the Independent Oil Well Cementing Company, has been making a trip through South and West Texas.

* * *

S. Settle, designing engineer with the Parkersburg Rig & Reel Company, Parkersburg, W. Va., is making a tour of inspection of the fields in Texas, Oklahoma and Kansas.

* * *

J. S. Ivey, chief geologist of the United Gas Company, Houston, Tex., has left for New York City where he will remain for an indefinite period at offices of the company there.

* * *

T. J. Haberly, assistant to E. H. Patterson, chief scout of the Shell Petroleum Corporation, Gulf Coast division, Houston, Tex., has returned from a vacation trip to San Antonio, Tex.

* * *

M. D. Gannon, safety supervisor of the Southern Crude Oil Purchasing Company, Fort Worth, Tex., attended the Nineteenth Annual Safety Congress and Exposition at Pittsburgh, Pa., returning by way of Tulsa.

* * *

H. C. Fowler, chief petroleum engineer, Bureau of Mines, will visit Bartlesville, Okla., the Zwolle Field south of Shreveport, La., and the Salt Flat Field near Luling, La., on an inspection trip. A study will be made of these oil fields in respect to development and production.

* * *

Allen Barnes, with the engineering department of the Parkersburg Rig & Reel Company, Parkersburg, W. Va., was recently operated upon for appendicitis in a Tulsa hospital. He has found it necessary to return for a few days' further treatment but is reported as now doing nicely.

* * *

Thomas R. Weymouth, president of the American Natural Gas Corporation and chairman of the board, Oklahoma Natural Gas Corporation, has been appointed to the board of trustees of the University of Tulsa in the class of 1931. His membership on the University of Tulsa board of trustees is the third position he has held in connection with educational organizations. He is trustee of the bureau of business research at the University of Oklahoma, and for several years was president of the board of education at Oil City, Pa.

* * *

W. A. Kirk, vice president of the U. S. Refining Company and secretary of the Exeter Oil Company, has severed his active connection with these concerns to organize the California Southern Oil Company which will conduct a marketing and oil brokerage business, with headquarters in Long Beach. Mr. Kirk, who is a member of the executive committee of the California Natural Gasoline Association, will not entirely divorce himself from the affairs of the U. S. Refining Company, but will act in a consulting capacity for that concern.

O. C. Needham, assistant production superintendent of the Gulf Production Company, Fort Worth, Tex., has recently completed a business trip via air to parts of Texas, Oklahoma and Kansas.

* * *

H. B. Fessler, with Black-Sivalls & Bryson, Inc., formerly with headquarters at Oklahoma City, has been transferred to the Fort Worth, Tex., office, and A. A. Arras of the same company has moved to Houston from Fort Worth.

* * *

Carl E. Young, Louisiana Paleontogical Laboratories, Baldwin, La., has transferred his headquarters to Houston, Tex. Mr. Young, previously to starting up his laboratory at Baldwin, was chief geologist of Ryeade Oil Corporation, Houston, and later chief geologist of the Union Sulphur Company, Sulphur, La.

Men of the Industry

Lyman B. Riddle

Warren County, Pennsylvania, was a scene of active oil operations when Lyman B. Riddle, vice president and assistant general manager of the Deep Rock Oil Corporation, was born there in 1889. His father was an oil man and young Lyman was still a boy when the family moved to Marietta, Ohio, which also became a famous oil center. After attending the public schools there, Lyman spent two years in Marietta College and then entered Case School of Applied Science, Cleveland, Ohio, from which he graduated in 1912.

During vacations the young man worked as a roustabout in the oil fields of Illinois and Wyoming. Following his graduation from Case school he acquired a string of tools and became a contracting driller. From 1912 to 1916 he worked as a contractor in the Nowata and shallow oil areas of northeastern Oklahoma and southeastern Kansas.

For the next two years Mr. Riddle was chief scout for the Ohio Cities Gas Company, with headquarters in Columbus, Ohio. In 1918 he was made assistant manager of production for the company, which soon afterward changed its name to Pure Oil Company. He held this position for four years, resigning to become manager of production for the Shaffer Oil & Refining Company, which recently became the Deep Rock Oil Corporation. In 1924 he was made vice president and assistant general manager.

Mr. Riddle has taken an active part in the oil conservation movement which began in 1926 and has a wide acquaintance among oil men in the Mid-Continent area.

C. A. Millikan, engineer with the Amerada Petroleum Corporation, Tulsa, flew to the Hobbs, N. Mex., area for a brief visit.

* * *

Byron Mitchell has been named as assistant to W. G. Winters, vice president and general manager of the Houston Gas & Fuel Company.

* * *

A. M. Blow, vice president, in charge of the Mid-Continent division of the Amerada Petroleum Corporation, is in New York City on a business trip.

* * *

Jess T. Hamilton, scout for the Sun Oil Company, Tyler, Tex., is laid up at home by an automobile accident. His injuries were not serious, but quite painful.

* * *

W. P. Jacobi, manager petroleum purchase division of the Wadhams Oil Corporation, has returned to his Tulsa office after a combined business and vacation trip to Wisconsin.

* * *

Graydon H. Laughbaum, district geologist of the Sinclair Oil & Gas Company, Seminole, Okla., has been appointed colonel on the staff of the governor of the State of Oklahoma.

* * *

John H. Wolfe, superintendent of production for the Prairie Oil & Gas Company, Tulsa, left for Pittsburgh, Pa., to attend the funeral of his mother, Mrs. V. F. Wolfe, who died of pneumonia.

* * *

Dr. Gerhardt G. Senftleber, of Tulsa, an assistant to Dr. Edward Bloesch, consulting geologist, is spending the summer in Switzerland. Doctor Senftleber is expected back about the first part of October.

* * *

E. H. Finch, geologist in charge of the Atlantic Oil Producing Company office in San Antonio, Tex., spent part of September in Washington, D. C., and New York, and visited the Atlantic refinery and offices in Philadelphia.

* * *

H. N. Greis, president of the Burke-Greis Oil Company, has returned to Tulsa after spending several months in Continental countries. His itinerary included visits to Germany, France and Czechoslovakia.

* * *

A. C. Howard, vice president and director of the United Gas Corporation and also connected with other companies associated with the United Gas Company, Houston, Tex., has resigned his connections with these companies to become associated with the Moody-Seagraves interests.

* * *

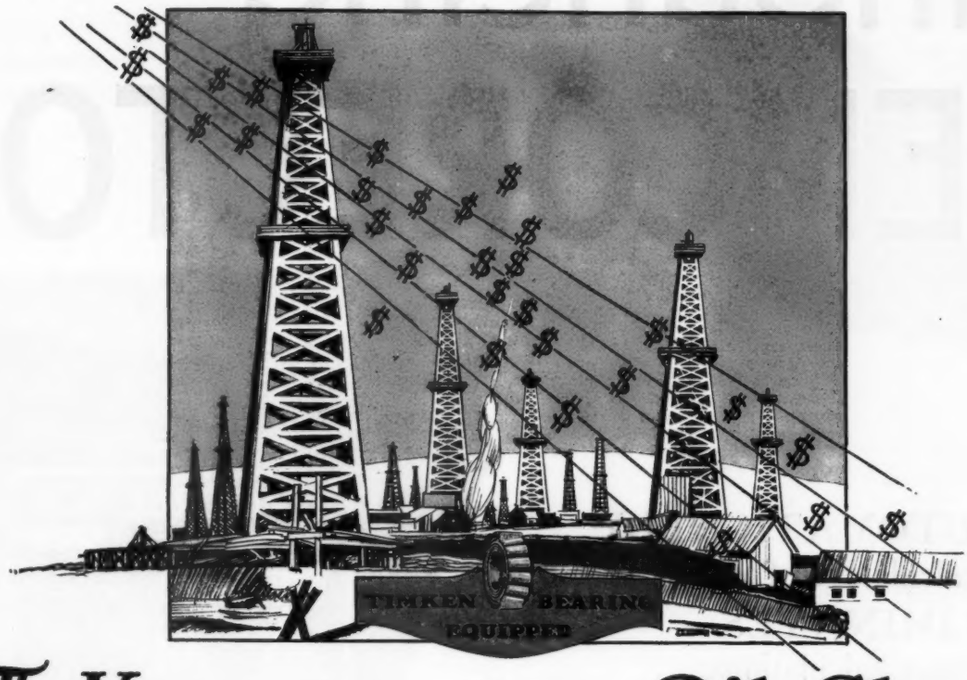
George B. Collins has resigned as title clerk in the Kansas land office of the Skelly Oil Company to become right of way clerk in the Great Lakes Pipe Line Company office at Chicago. Joseph Quigley, who has been scout in Kansas for the Skelly Oil Company, has gone with Mr. Collins.

* * *

The appointment of W. Rawson Collier as vice president and general manager of the Mississippi Natural Gas Corporation and the Alabama Natural Gas Corporation is announced. He will be in complete charge of the operation of all properties of the company in Alabama.

* * *

Julian L. Foster, chief engineer for the Lone Star Gas Company, Dallas, Tex., accompanied by R. L. Vandercook, pipe line superintendent, and Wilder Keenan, consulting engineer on bridges, member of Matthew & Keenan, consulting engineers of San Antonio, Tex., are making an inspection tour of the Missouri Valley pipe line which is being laid from the Panhandle of Texas to Nebraska and Iowa, to carry natural gas. The Lone Star Gas Company is a joint owner of the Missouri Valley pipe line; the United Light & Power Company and North American Light & Power Company are the other companies interested in the line.



The Keynote of the Oil Show

"PRODUCTION ECONOMY" is the key-note of the Oil Show and the oil fields.

In tapping the world's oil wealth, and in keeping the rich oil flowing to satisfy modern needs, American oil operators have displayed the same initiative and progressiveness which have been responsible for America's world-wide industrial predominance.

And in no division of American industry have machinery manufacturers shown broader, more penetrating vision, keener judgment and greater co-operative spirit than the builders of modern oil field equipment.

This is proved and re-proved at each successive Oil Show, where improvements and refinements in mechanical equipment of all types continually point the way to the production of a greater and greater volume of oil per dollar of investment.

Timken is proud to have the privilege of contributing to this outstanding efficiency through the medium of Timken Tapered Roller Bearings.

Spaces No. 72 and 73 Texas Building, Seventh International Petroleum Exposition and Congress, Tulsa, Okla., October 4-11.

Meeting all modern anti-friction requirements in drilling and pumping units, gas and steam engines, countershafts, speed reducers and all other oil field machinery, Timken Bearings save power and lubricant, carry radial, thrust and combined loads, promote attention-free dependability, slash maintenance costs and prolong machine life.

Thus "Timken Bearing Equipped" has surged on and on . . . sweeping over the oil fields in a rapidly mounting wave of economy . . . helping operators to extract more profit from every barrel of oil.

There are now more Timken Bearings in use in the oil fields than all other makes of anti-friction bearings put together.

As you go through the 1930 Oil Show, make it a point to observe how much of the machinery on exhibition bears the modern symbol of anti-friction protection, "Timken Bearing Equipped"—the key-note of production economy. The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN *Tapered Roller* **BEARINGS**

Announcing the EMCORECTOR

DIRECT READING FOR BILLING

AUTOMATICALLY
calculates to 4 oz. base pressure.
ELIMINATES
chart calculations.
ADAPTABLE
to any make iron case meter.

IMPORTANT:
To insure prompt shipment place orders at once.

EMCO METERS AND REGULATORS

PITTSBURGH EQUITABLE METER COMPANY

Main Office and Works—Pittsburgh, Pa.

New York City · Chicago, Ill. · Los Angeles, Calif. · Tulsa, Okla. · Dallas, Texas · Columbia, S. C. · Salt Lake City · Kansas City, Mo. · Seattle, Wash. · Houston, Texas

Natural Gas Industry Developments

Aggressive Policy Urged to Increase Sale of Gas Ranges

A determined drive by gas utilities to forestall inroads being made into the domestic cooking load by other industries was decided upon at a meeting of the domestic range committee of the American Gas Association and has received the approval of the executive committee of that association.

In the past few years both the electric utilities and oil heating appliance companies have made attempts to build up a domestic cooking business and it is this which has occasioned the present drive of the gas industry.

The following resolution has been unanimously adopted by the executive board of the American Gas Association:

Whereas, other industries are putting forth strong sales efforts to secure a portion of the domestic cooking load, such efforts being no longer confined to rural areas not served by gas but intended as direct inroads on the present cooking loads of gas companies in many situations, and

Whereas, it is easily demonstrable not only to ourselves but to the public, that gas is a supremely satisfactory fuel for cooking, and that the modern gas range includes all of the latest devices for automatic control, comfort, economy, efficiency and convenience, thereby making the necessary appeal to the customer,

Now therefore be it resolved, that in order that the gas industry may hold and increase its present domestic load, of which cooking represents over 50 per cent, aggressive policies are necessary on the part of responsible executives by inaugurating comprehensive and continuous programs for merchandising the latest type of modern gas ranges.

Be it further resolved, that this program should include the following activities:

1. Sales promotion, in both the new and replacement markets, of improved types of modern ranges with insulated heat controlled oven, preferably with automatic time control. Continuation of manufacturers' efforts to increase the "eye-value" of all gas appliances.
2. The expenditure of more money in advertising, publicity, and other sales promotional activities to inform the public of the desirability and economy of gas over other fuels, when used in the most modern type of gas range.
3. Sales supervision and personnel of the highest type, capable of directing and applying modern merchandising methods —compensated in an effective manner.
4. Recognition of the fact that, in the industry's desire to build the load with other appliances, there must be no curtailment or omission of activities designed to retain its present basic cooking load. The program recommended will not only reinforce the industry's efforts to sell gas for other purposes but will increase the present cooking consumption.
5. On the part of companies furnishing both gas and other fuels, it is evident that an executive policy as to sales of appliances should be laid down and adhered to.

NEW KANSAS CITY WELL

KANSAS CITY, Mo., Sept. 29.—Another gas well adjacent to Quindaro Boulevard, a principal business street in the north section of Kansas City, Kans., has been brought in. Gas was struck at 360 feet. The well is expected to produce 500,000 feet daily. The Midwest Oil Co. drilled the well under the supervision of George Newland.

ASK PIPE LINE CONTROL

WASHINGTON, D. C., Sept. 29.—A number of communications have been received by the Senate Committee on Interstate Commerce proposing federal control of interstate traffic of natural gas by pipe lines, it was stated at the office of Senator Couzens (Rep.) of Michigan, chairman of the committee.

The claim has been made, it was said, that some utility companies dealing in the natural product are mixing the natural gas with artificially manufactured gas and distributing it to their customers as a 100 per cent artificial product.

No interstate regulation of this comparatively new industry has heretofore been exercised, it was said, though its growth has been considerable within the past few years.

TIOGA GASSER CONTROLLED

WELLSBORO, Pa., Sept. 27.—The big gasser of the Allegany Gas Co. at Elkland, Tioga County, has been placed under control by 25 workmen under the supervision of L. L. Mackowski of the Oil Well Supply Co.'s packer department in Bradford. This well has been estimated as high as 20,000,000 feet a day.

The original intention of the gas company was to drill the hole to a depth of about 6,000 feet, but when a depth of 4,000 feet had been reached the well came in with a roar and sent approximately $7,000 worth of gas into the air daily until it was harnessed. The strike was made on September 9.

The well is the most easterly gasser in Pennsylvania, but is southwest of the gas field near Watkins Glen, in New York State.

MONTANA RATE CASE

CASPER, Wyo., Sept. 27.—The Montana State Railway Commission of Montana held a hearing at Glasgow, in Valley County, on the matter of gas rates for the cities of Glasgow, Hinsdale and Malta. The Bowdoin Utilities Co., which supplies natural gas to the cities had attempted to raise the rates of gas from 40 cents to 75 cents and the cities protested to the State Railroad Commission. The commission heard testimony and took the matter under advisement. The state engineer made a valuation survey of the plant and equipment of the Bowdoin Utilities Co. and placed the value of the plant at $527,731.

ENGAGE GAS EXPERT

CHATHAM, Ontario, Sept. 27.—The joint natural gas committee representing the four Saskatchewan cities of Regina, Moose Jaw, Swift Current and Saskatoon has decided to engage an expert who will advise as to the merits of the several offers for natural gas franchises received by the Saskatchewan cities. Gas companies applying for franchises have been given two weeks from September 20 to submit their best offers together with written evidence of their ability to carry out the proposed contracts.

ST. THOMAS GAS PROPOSITIONS

CHATHAM, Ontario, Sept. 27.—Alternative proposals for the purchase of the municipal gas plant at St. Thomas, Ontario, have been submitted by United Fuel Investments, Ltd., of Hamilton and the Dominion Natural Gas Co. of Buffalo. It is understood the Central Pipe Line Co. of Chatham is also submitting a new proposition involving the development of a natural gas supply in the vicinity of St. Thomas.

SERVICE EXTENSIONS TO OKLAHOMA TOWNS

Natural gas service has been made available to Duke, Okla., by the completion of a line constructed by the D. & O. Utilities, Inc., from a point north of Altus through Victory to that city. The same company recently established natural gas service at Olustee. Several more Oklahoma towns have prospects of securing natural gas before fall. These include Cheyenne, which is to vote October 7 on a natural gas franchise to the Cheyenne Utilities Co., which promises to have gas in the town by December 1 if granted the franchise. Carmen, Aline and Dacoma will secure natural gas service from the Winchester Oil & Gas Co., probably before winter, if those towns approve franchise proposals of that company now pending. Officials of the Pioneer Gas Utilities Co. announce that construction will soon begin on a gas pipe line to Jones City. The line will connect with the line already laid from the Oklahoma City Field eastward to Choctaw and Harrah, now serving several towns. The Pact Gas Co. has applied for a franchise at Coyle. The company is serving several towns and is now constructing a gas distribution system at Agra. Warner is voting on granting a natural gas franchise to the Quinton Natural Gas Co., the supply to come from the Quinton, Okla., Field.

MEMPHIS NATURAL GAS SALES

Memphis Natural Gas Co., over 46 per cent of the common stock of which is owned by Appalachian Gas Corp., reports sales of 5,658,761,500 feet of natural gas during the first eight months of 1930, against 3,430,154,800 feet for the corresponding period last year, a gain of over 65 per cent. With the recent completion of additions to the company's compressor station in Guthrie, La., to provide additional supplies of gas to take care of new contracts becoming operative with the approaching heating season, and upon completion of the new Greenville-Greenwood pipe line in Mississippi, now in course of construction, a further increase in volume of sales is expected.

CANADIAN GAS NEWS

CHATHAM, Ontario, Sept. 27.—The Red Deer, Alberta, board of trade is negotiating with the Canadian Western Natural Gas, Light, Heat & Power Co. for a supply of gas from the Turner Valley Field.

Following the extension of its local system to the residential section of Taber, Alberta, the Canadian Western Natural Gas Co. held a two-day demonstration of the uses of natural gas. Among those who took part were J. Clark, in charge, R. S. Winter, superintendent of Lethbridge district; R. Clifford, appliance inspector; and Miss H. L. Aylesworth and Miss Esch of the home service department.

MEXICAN OIL TAXES

Mexican oil production and export taxes for September are unchanged from those of August, with a tax of 14.864 cents a barrel on light crude, 8.585 cents on heavy crude and 13.203 cents on fuel oil. Combined production and export taxes are 22.813 cents a barrel on light crude, 13.513 cents on heavy crude and 19.563 cents on fuel oil.

UNITED GAS OFFICES

United Gas Co. of Houston, Tex., has moved its offices from the Neils Esperson Building to the Rusk Building, in which the company has leased the entire eighth, ninth and tenth floors.

NEW JERSEY HEATING RATES

NEW YORK, Sept. 29.—The Public Service Electric & Gas Co., a subsidiary of the Public Service Corp. of New Jersey, has filed with the New Jersey State Board of Public Utility Commissioners new tariffs for users of gas in large quantities, which include a reduction in rates for heating houses with gas.

The tariff, just filed, establishes a rate of 7.5 cents per 100 feet for heating houses with gas provided that the customer guarantees use of 200,000 feet during the heating season of eight months. The present rate is 8 cents for 100 feet with a guarantee of $160 instead of $150 a season.

The wholesale demand rate for large users provides a demand charge ranging from 55 cents for 100 feet for the first 50,000 feet to 15 cents for more than 600,000 feet a month and a commodity charge of 6 cents for 100 feet for the first 500,000 feet used, 4 cents for the next 1,000,000 feet and 3½ cents for more than 2,000,000 feet used a month. It further provides that the monthly minimum charge shall be in no case less than $500 a month.

The new rates, both of which are optional, will be effective with the bills rendered after October 1.

PETROLIA GAS SYSTEM

CHATHAM, Ontario, Sept. 22.—Under the supervision of M. R. Shanks, district superintendent, extensive improvements have been made this year to the distributing system of the Union Natural Gas Co. in Petrolia, Ontario, and vicinity. The present work is a continuation of a program in progress for some three years. Extra town and rural lines have been built and approximately half the local distribution has been replaced by larger mains.

The Union Natural Gas Co. has also extended its transmission lines northward from Petrolia to Wyoming, and east from Oil City to Inwood and Alvinston. The latter lines have been completed, and the Wyoming lines will probably be finished this month.

TAXATION IN ARKANSAS

SHREVEPORT, La., Sept. 29.—At a recent meeting of the Arkansas Tax Commission and the county boards of equalization of Union and Ouachita Counties, the proposed uniform schedule of assessments on oil and gas wells, equipment and other oil and gas properties, leases, etc., submitted by the Louisiana-Arkansas division of the Mid-Continent Oil & Gas Association, was adopted, with amendments. The county boards announced they could not accept the schedule in its entirety but did agree to reduce the assessment on oil wells from $750 each to $500 with the understanding that abandoned wells, with casings intact, shall be rendered at a valuation of $175. This agreement finally disposes of the matter of tax valuations in Arkansas for the current year.

NEW UNITED GAS BUILDING

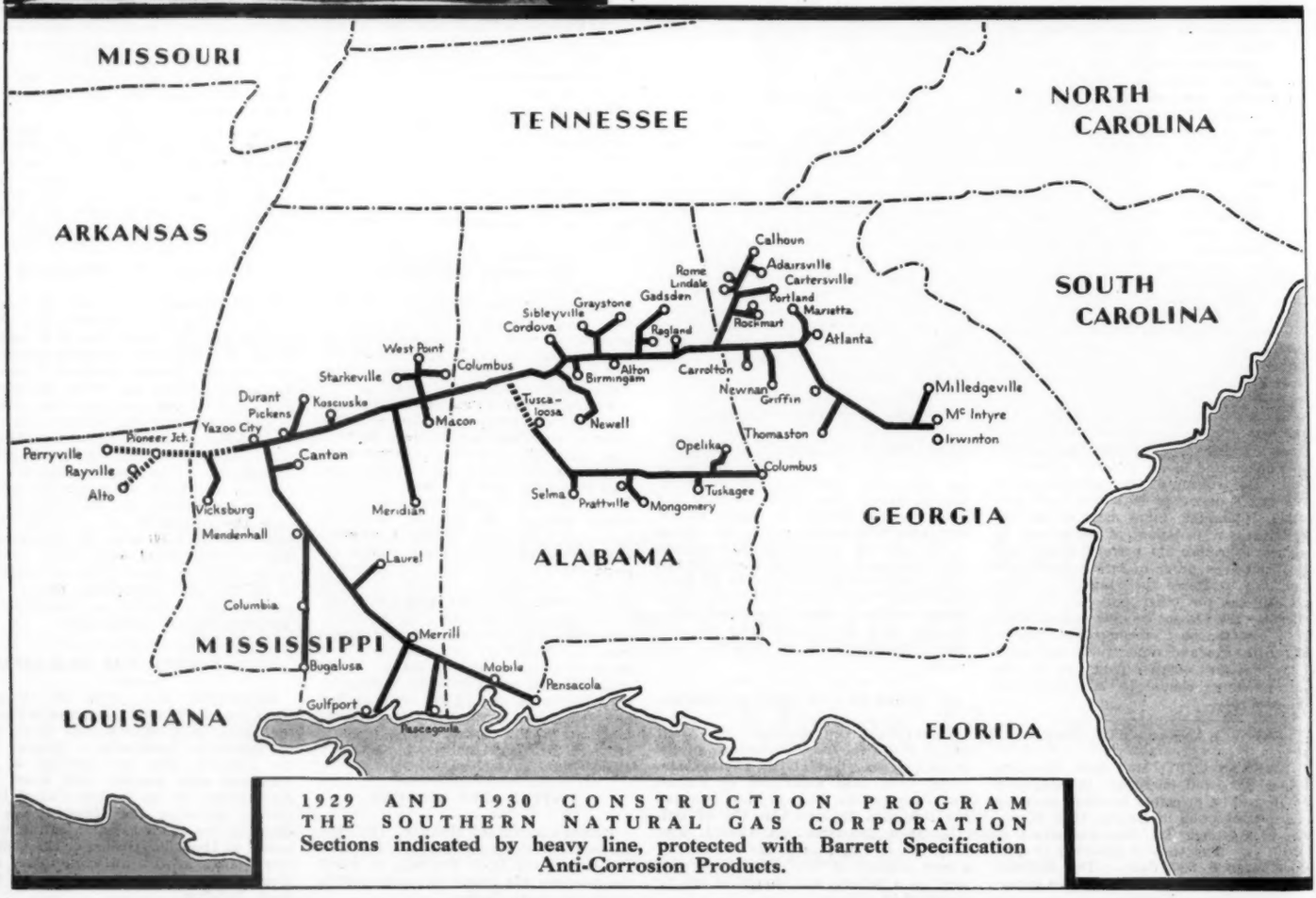
HOUSTON, Tex., Sept. 29.—United Gas Co. and affiliated companies of Houston, Tex., have made known plans for the immediate erection of a 10-story office building. The new building, to be completed next summer, will house all departments of the various United Gas system, including the Houston Gas & Fuel Co., one of the gas distributing companies at Houston. Offices of the United Gas companies, with the exception of the Houston Gas & Fuel Co., now are in the Rusk Building.

Barrett Specification ANTI-CORROSION PRODUCTS

Picture shows construction of a section of the Southern Natural Gas Corporation's Pipe Line System. Barrett Specification Anti-Corrosion Products used to insure long life.

BARRETT SPECIFICATION ANTI-CORROSION PRODUCTS

. . . include felt reenforced enamels for extreme conditions—rivers, swamps, etc., enamels to be applied hot in less corrosive soils; cold applications for still less corrosive locations.



1929 AND 1930 CONSTRUCTION PROGRAM
THE SOUTHERN NATURAL GAS CORPORATION
Sections indicated by heavy line, protected with Barrett Specification Anti-Corrosion Products.

PROTECT

the SOUTHERN NATURAL GAS CORPORATION SYSTEM

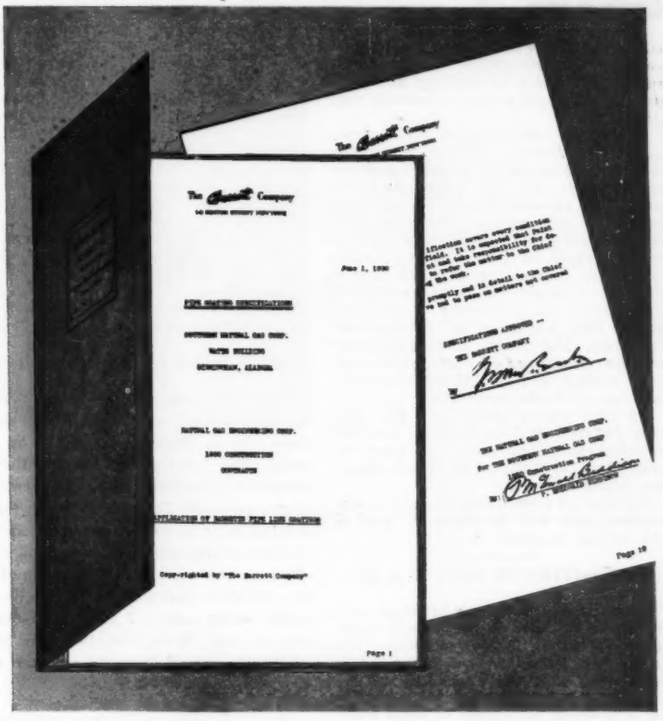
THE Southern Natural Gas Corporation's pipe line system serving the Southeast with natural gas, forms a network which extends through the states of Georgia, Alabama, Mississippi and Louisiana.

In an installation of this size and character, the necessity for absolute protection against corrosive agents of every kind was of the utmost importance.

Hence a tonnage equalling more than 400 carloads of Barrett Anti-Corrosion Products—Enamels, Primers and Cold Application Products was used.

It is needless to say that this choice was made only after careful investigation.

Barrett Anti-Corrosion Products include: *Enamels*—made with the finest grade of Coal Tar Pitch, and a flake type of internal re-inforcement which permits the use of a higher percentage of waterproofing base. *Primers* and *Cold Application Products*—utilizing the same base with suitable solvents. *Pipe Line Felts*—saturated with waterproofing, a re-inforcement to permit the use of a maximum amount of protective coatings.



Individual Specifications for the Individual Job

To the quality of Barrett products must be added the value of a complete Service. Barrett Construction Specifications are written for the individual job, and provide the best methods of application under existing conditions. Barrett Service also supplies quantity surveys and field inspection.

Barrett Anti-Corrosion Products are a guarantee of pipe line protection properly, adequately, economically provided—and ready to serve for years to come.

Bulletins on Barrett Anti-Corrosion Products are available and can be had for the asking.

The Barrett Company

40 Rector St., New York

Field Problems and Their Solution

EDITED BY THOMAS F. SMILEY

In order that men connected with the drilling, producing and transporting branches of the petroleum industry may procure quickly a solution of many problems confronting them from time to time in their work, The Oil and Gas Journal has arranged with leading engineers and other recognized authorities to answer questions submitted by readers of this publication pertaining to the work of drilling and producing crude oil and transporting this product.

Everyone is invited to submit questions freely. These questions will be submitted to proper authorities by Mr. Smiley, who edits the page, and answers, based on the best available information, will be published. Each question should give as much detail as possible, especially where it relates to matters where depths of sands, types of sands and operations on adjoining properties would have a bearing on the problem involved. The source of all questions will be considered as confidential and only initials will be published in connection with the question.

In this connection, The Oil and Gas Journal will be glad to publish articles from field men who have devised new methods or practices which are improvements.

In case an immediate answer is important, one will be given by mail if the writer requests it.

DISPOSITION OF SALT WATER

Disposition of salt water produced with the oil in this area is becoming a really serious problem. I have something like 35,000 bbls. of salt water to get rid of daily now, with the probability of the quantity growing. I have been wondering if it would be feasible to make a circular pond by scraping the earth (mostly sand) from the center and making a dike around the outside with it, and then drilling a half dozen or so holes through the first hard stratum in the bed of this pond. Would not the salt water run into this pond disappear by evaporation and absorption?

I am sure that there have been articles printed in your publication dealing with the handling of salt water produced from oil wells, and if you can refer me to some of them I will appreciate it.—M. H. S.

Salt water disposal is a problem that is variable with every field, and without very definite knowledge of the geological formations in the field in which you operate it would be hard to answer your question in toto.

However, you might be interested to learn that in the Winkler County, Texas, pool where a scheme similar to that outlined in your question was tried it was found that the underground stratum into which water was returned did eventually fill up and water actually flowed back into some wells, so that it had to be rehandled.

There seems to be no short cut to disposing of water that has come from a pool where oil is produced. If it is spilled on the ground to evaporate and sink into the subsoil the rate of evaporation and absorption of the soil are limiting factors, and experience has shown that once water has established lines of communication with lower formations, even though they long may have been in disuse, they will again conduct this surface water back into old underground channels if the water is dumped on the surface. This means rehandling from the wells, an unprofitable undertaking.

The most successful water disposal method has been that of removing the water from the field and dumping it into bayous or streams when its solid contents were so reduced as to be below the requirements of the law.

Articles on salt water disposal have been published in The Oil and Gas Journal and a list of them is subjoined. Some of these ideas may be applicable to your particular problem.

"Disposal of Oil Field Water Studied by Engineers," August 22, 1929; "Production Problems in the Winkler Field," April 24, 1930; "Salt Water Disposed of By Seepage," March 8, 1930; "Innovation in Dehydration Process — Double Settling System Worked Out by Engineering Department of Rycade Corp. in the Orange Field," July 28, 1928; "Coastal Salt Water Problem Solved," July 19, 1928; "Water Problems in the Northern Part of the Cushing Field, Creek County, Oklahoma," March 13, 1930; "The Disposal of Oil Field Brines," September 12, 1929; "Methods of Waste Water Disposal," September 5, 1929; "Disposal of Salt Water and Waste Solved in Louisiana," April 12, 1928.

DRILL PIPE CAUSES TROUBLE

Drill pipe threads that are either dirty or defective or possibly damaged cause more trouble than they ought to on my lease. The pipe has to be discarded often because the threads are in such condition that a good safe fit is no longer possible. I tried using a wire brush to clean all threads before running and I think that did some good, but even then it was often the case that some kind of obstruction or misfit would occur. I have wondered if men in other fields have the same kind of trouble and if they have found any way of meeting it.—S. E. L.

Much of the trouble you experience should be obviated by observing certain precautions in the handling of the drill pipe. Rough or negligent treatment will ruin any oil field material in the course of time. It looks as though the practice of screwing the joints even when it is plain that something is wrong is responsible for the shortened life of your drill pipe. The following rules recommended by the American Petroleum Institute are offered for your consideration:

1. Before running any drill pipe clean all threads carefully, using a soft pine paddle, followed with a bristle brush and gasoline. Do not use a wire brush for this purpose, as it is impossible to get the threads perfectly clean by this method.
2. Inspect all threads carefully and file out any that are closed or slightly bruised.
3. Give the threads of pipe and couplings or tool joints a good coating of zinc dust grease.
4. Stab each joint carefully, so that the starting threads will not be damaged.
5. After stabbing use the hand tongs for the first part of the screwing. This will enable you to tell if the joint has been properly stabbed and if it will make a good fit.
6. Make sure that the couplings or tool joints have been screwed up to the standard position. Do not depend upon the joint making up during the process of drilling.
7. Endeavor to handle the rotary slips in such a way that the surface of the pipe will be cut as little as is necessary. Never attempt to revolve the stem with the slips. Drill pipe which has become deeply cut or scratched should be laid down.

PARAFFIN IN SHALLOW WELLS

In your issue of February 6 you advised us to use a mixture of metallic aluminum and caustic soda to melt the paraffin in our shallow wells. These wells have about 15 feet of sand. Please say in what portion these items should be mixed and the quantity of each to use for the above thickness of sand. Also how long should this stay in the well before heating properly so that the 2-inch working barrels could pump the fluid out? Would you mix and pour in through the casinghead opening or pour in the wells separately?—J. H. M.

The information for which you ask does not appear in any published works at hand, but a local chemist says that about 1 pound of aluminum and 1½ pounds of caustic with 4 pounds or more of water would produce a chemical reaction that should bring about the desired results. Excess water of course would tend to reduce the heating of the paraffin, for the heat generated by the chemical reaction would be expended on the water rather than on the paraffin.

It is probable you best can determine the time required to generate the heat required to melt the paraffin in your well by a little experimenting at the surface. Mix some aluminum with caustic and water in the proper proportions and add to the mixture some of the paraffin from the well, samples of which it is assumed are available.

If your wells are oil wells it probably would be best to pull the tubing and run in the mixture in a bailer and dump it at the bottom of the hole. This would get the mixture to the point of use with the minimum amount of loss, for if it were poured into the well it naturally would be spread out along the full length of the hole with considerable loss.

It is possible that a letter addressed to The Aluminum Co. of America, Pittsburgh, Pa., would bring you information concerning some company prepared to furnish caustic-aluminum mixtures in proper proportions and put up in packages for convenient use in the wells. You might do well to obtain typical samples of the material at the bottom of the hole to be certain that it really is paraffin that is causing the trouble and not a mixture of sands, shale, sediment and paraffin which has been forced against the face of the sands in the well. It is suggested that you write to the Publication Department, Bureau of Mines, Washington, D. C., for a list of its publications on this and similar subjects.

WHY WAS IT CALLED THAT?

LOSING THE MUD

Among the many things that may brighten the rotary driller's life is the discovery that his rotary mud is disappearing somewhere in the earth beneath him, in which case he is said to be "losing his mud." This is likely to be the result of drilling into a cavern or an extremely porous formation into which the mud escapes. The driller's usual procedure to meet the situation is to increase his supply of mud, work it to a thicker consistency and then pump it into the hole until the cavern is filled or the porous formation is sealed off.

BENEFITS OF LOWERED TUBING

Will lowering the tubing of a flowing well result in increased production in all cases? Have actual experiments demonstrated that this is good practice? My understanding is that experiments along this line were made in one of the California fields and that these experiments showed big benefits from lowering the tubing?—E. G. L.

The experiments to which you refer were conducted in the Long Beach, Huntington Beach and other California fields. Similar experiments have been conducted in other areas and all are reported to show that tubing depths have an important bearing upon the efficient utilization of gas in the recovery of oil.

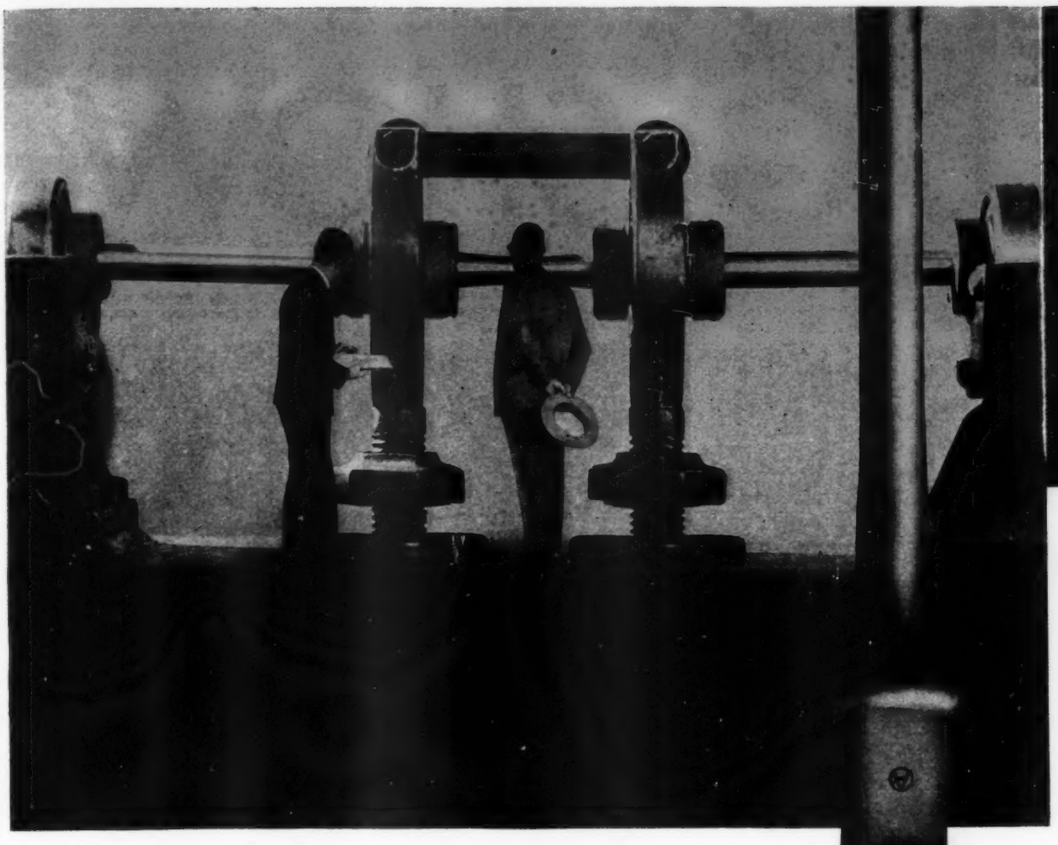
The production of one well in the Long Beach Field declined suddenly from 420 bbls. daily to 138 bbls. The tubing in this well was lowered from 2,543 to 3,039 feet, at which point it was about 152 feet below the perforations in the casing. Production increased at once to more than 440 bbls. a day, and the casing pressure, which had declined to about 60 pounds per square inch, rose to 130 pounds. After the tubing had been lowered the well flowed for about a month and in that time the production fell from 440 bbls. a day to 200. It was believed that the change in the tubing had been made too late to obtain the best results.

In another well in the same field production fell in two weeks from 700 bbls. a day to less than 130. The tubing was lowered from 2,790 feet to 3,500 feet, where it was 832 feet below the top of the perforations in the casing. The well began flowing again at more than 475 bbls. a day. These two wells strengthened the belief of production men and engineers that lowering of the tubing should not be delayed until the well is almost dead.

The depth of the tubing affects principally the efficient use of gas energy in raising the fluid to the surface after it has entered the well. A well tubed too high flows inefficiently because opportunity is afforded for the oil and the gas to separate in the casing before the mixture enters the tubing. It is true also that the separation and expansion are not so effective in lifting the oil in the larger cross section as they are in the smaller. Data obtained from California fields, especially the Huntington Beach, on similar groups of wells showed that the low-tubed well had longer flowing life, better sustained production and lower gas-oil ratio.

It should be remembered that tubing once installed in a high-pressure flowing well cannot be changed with safety and its depth cannot be altered without likelihood of killing the well. It is important, therefore, to tube wells in the first place so that they will operate efficiently until the pressure has fallen to a point where it is practicable to lower the tubing.

Determining the correct depth of tubing in a flowing well depends upon the adoption of an average depth that will give the greatest efficiency during the period of flush production until such a time as it is safe to change the depth of the tubing. Large flowing wells will produce satisfactorily when tubed at some point above the top of the producing sand or at some point above the top of the perforations opposite the oil sand. These same wells, after the period of flush production is over, will flow efficiently only when tubed below the top of the perforations. Maximum flowing efficiency up to the time when the tubing may be lowered will be gained by tubing flowing wells to a point below the top of the perforations and preferably well toward the bottom.



Standard Type Tinius-Olsen Endurance Testing Machine is used to check Axelson rod stock

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

JAMMING YEARS OF PUNISHMENT INTO A FEW TEST HOURS

FIELD experimentation is a slow and costly process. It is essential, however, that many tests be made this way. In addition to field tests, Axelson give their products every known laboratory check. This preliminary testing, this breaking down of material and design under extreme conditions, is faithfully patterned to correspond with actual field conditions. The knowledge gained from these tests not only enables Axelson to build a better product, but to test it quicker, oftener and more severely than would be the case if field records were alone used.

The Axelson laboratory is modern and completely equipped with various approved types of testing machines. Within a few hours in this one laboratory a complete chemical and physical analysis can be given any Axelson product.

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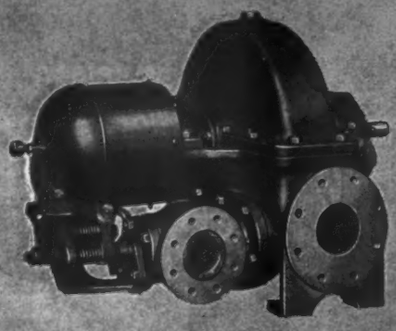
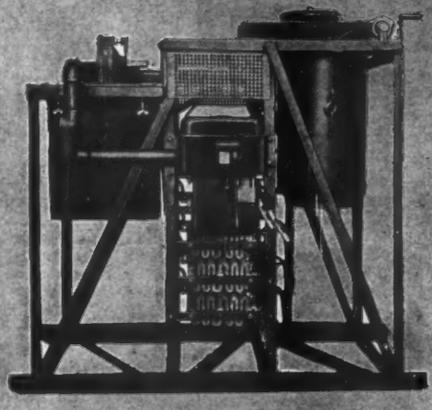
AXELSON SUCKER RODS . . .

AT THE BIG SHOW



1 New G-E mechanical drive turbine, 5 to 50-hp., noncondensing

2 G-E Type K totally enclosed, fan-cooled, Class I induction motor for hazardous gas conditions



3 G-E protected-type control unit for two-speed oil-well motor

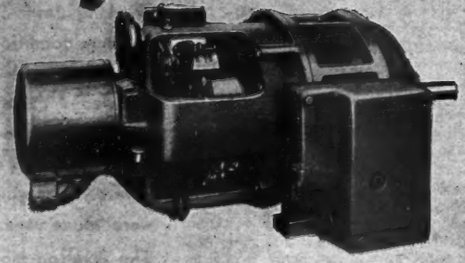
4 Audible, selector-type, automatic supervisory equipment. (Above) Dispatcher's control panel

Double-wheel mechanism for cable-tool drilling

Headache-post control mechanism

5

Single-wheel mechanism for pumping or for rotary drilling



6 G-E Type BTA adjustable-speed motor — the a-c. motor with desirable d-c. characteristics

GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

GENERAL ELECTRIC *presents:*

1

NEW MECHANICAL-DRIVE TURBINE

2 the answer to the demand for a reliable, small, low-cost steam drive.

TOTALLY ENCLOSED FAN-COOLED CLASS I MOTOR

3 especially designed for use in hazardous locations.

PROTECTED CONTROL UNIT

4 for oil-field service. Features the elimination of oil in the cam-operated switch.

AUTOMATIC SUPERVISORY EQUIPMENT

5 for the remote control of pumping stations. The operator at the dispatcher's office can open and close valves and breakers, start and stop pumps, and receive automatic indication of oil level, hot bearings, blown gaskets, position of valve gates, running and stopped position of pumps, loss of pressure, etc.

HEADACHE-POST CONTROL

6 a convenient means for remote operation of controllers on drilling and pumping rigs.

TYPE BTA MOTOR

makes operation at reduced speeds more economical, and is well adapted to remote control.

You are cordially invited to visit G-E booths, Space No. 77, Texas Building. There you can obtain complete information concerning these and other G-E developments.

200-403

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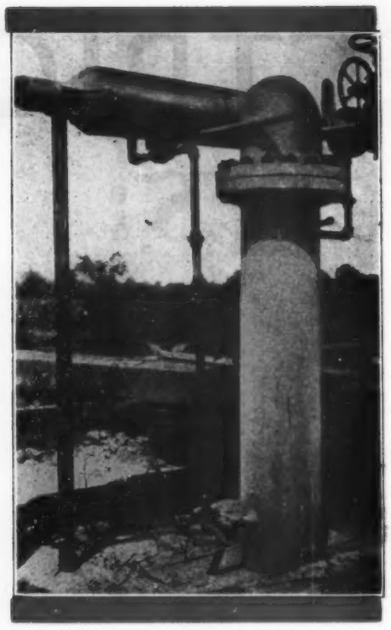
SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES



WETZEL AUTOMATIC GAS SEPARATORS

pay for themselves in gas they save

A most enthusiastic welcome is being given the WETZEL AUTOMATIC GAS SEPARATOR by the Oil and Gas Industry. Operators who have had the opportunity to see its positive action and simplicity have been quick to recognize the efficiency and the money-saving possibilities of this separator.

There is no loss of Syphon Gas with the WETZEL SEPARATOR on your well as there is no necessity of blowing a Syphon out into the open. Oftentimes this saving in gas is sufficient to pay for the low installation cost of the WETZEL SEPARATOR.

INVESTIGATE TODAY this newly developed separator that pays for itself in gas saved.

Use of the well 24 hours every day

By installing a WETZEL SEPARATOR on a gas well in which a Syphon has been used, the Syphon is connected into the inlet pipe through the Header, which does away with blowing the Syphon out into the open. If the gas coming through the Syphon is not as great in volume as you want to take from any particular well, then the side gate may be opened and additional gas may be taken simultaneously with the Syphon to satisfy the requirement from that well.

In this way it is never necessary to shut a well off to blow the water out through the Syphon, thus giving use of the well for the full twenty-four hours of each day, and without loss of Syphon Gas or leakage of any kind.

Let the Norvell-Wilder Man call and explain the many economies this separator can bring to you.

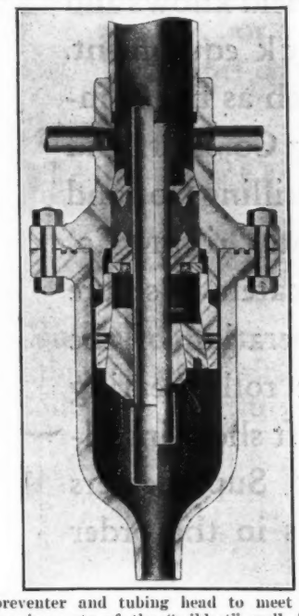
Norvell-Wilder Supply Company

BEAUMONT HOUSTON SHREVEPORT FORT WORTH

Oil Field Equipment and Supplies

BLOWOUT PREVENTER AND TUBING HEAD ANNOUNCED

In response to the growing demand for heavier and stronger equipment, the Baash-Ross Tool Co., Los Angeles, Calif., has designed a new combination blowout



preventer and tubing head to meet the requirements of the "wildest" well. The new appliance consists essentially of a cast steel body, an improved Baash-Ross blowout preventer assembly, and a cast steel bonnet, which are tested to 5,000 pounds pressure. The body is provided with a spider with which may be used slips for either drill pipe or tubing. The tool has three different ways of sealing off pressure.

1. The packing assembly itself consists of top and bottom split steel rings, between which is dovetailed a rubber packing ring. The top ring has a set of latch rings that automatically catch below the lower edge of a spider which is screwed into the main body and prevents the assembly from coming out. By screwing down the spider tightly upon the ring the rubber will remain expanded, packing off the well in this manner and by slightly backing off the spider ring the drill pipe or tubing can be raised or lowered the full length of the joint.

2. In operation the cast steel body is screwed to the outer casing, as in the standard Hosmer type blowout preventer. Drilling may proceed through the body, and in the event of danger of a blowout occurring the blowout preventer assembly is placed around the drill pipe and dropped into the body where it automatically locks. The drill pipe coupling or tool joint then is lowered until it rests on the upper ring of the assembly, which expands the rubber and seals off the gas pressure.

3. The assembly is so designed that the drill pipe may be picked up until the tool joint or coupling below the blowout preventer assembly forces the packing rubber to expand.

If the operator desires to allow the well to flow through the drill pipe, slips may be inserted between the pipe and the spider to hold the pipe. Then the cast steel bonnet is bolted to the main body. Some operators assemble the bonnet on the christmas tree at first, and then it is readily assembled with the body.

In the event that tubing is run in, a bushing is placed on the inside of the spider to accommodate tubing slips.

NEW PIECES OF EQUIPMENT FOR THE OIL COUNTRY INTRODUCED BY IDECO

Four new pieces of oil country equipment have been introduced by the International Derrick & Equipment Co., Columbus, Ohio. They are the Ideco Super Duty four-speed drawworks, Ideco 27½-inch oil bath rotary, Ideco Type B portable drilling rig and Ideco 6-inch oil bath swivel.

The Super Duty two-post, three-shaft, four-speed drawworks is designed for drilling wells 12,000 feet and deeper. All shafts are made of chrome nickel steel, heat treated. The shafts have full diameter between the bearings and are not turned down at clutches and sprockets. They are mounted in heavy duty roller bearings. The bearing housings are made of alloy steel and are of the self-aligning type, which permits the bearing assembly to swivel sufficiently to insure perfect alignment with the axis of the shaft.

The spooling drum and heavily ribbed drum flanges are cast integrally. The drum spooling surface is grooved for wire rope and the large diameter of the drum affords a wide bending radius to the wire line.

The brake flanges are water-cooled and are offered in two types—one made of nickel cast iron, and the other of forged alloy steel. Both brake bands are of the free-expanding, nonbursting type. All contacting surfaces are accurately machined. Water-cooled flanges are recommended for 3,000 feet and deeper drilling service.

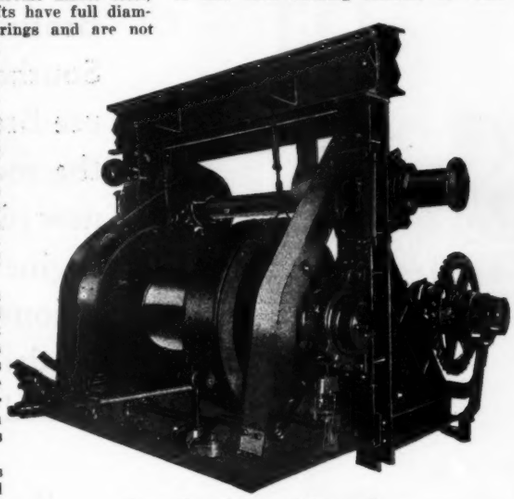
The steel brake bands are lined with a high-grade asbestos brake lining, having brass wire heat conductors interwoven throughout. The braking mechanism is furnished in either the post type or floor type. The drawworks is equipped with steel cat heads. Ample space is provided for automatic cat head or joint breakers. All sprockets are of chrome nickel steel.

The Ideco 27½-inch oil bath rotary is the latest development of the Boykin division of the company and is intended for the heaviest drilling service. It differs from the other Ideco designs in that it is a straight rotary. The base and skids are made of chrome nickel steel cast integrally, providing low table of exceptional strength. A pinion shaft of large diameter, made of special forged steel, is mounted in heavy duty roller bearings. The pinion is of forged steel, heat treated, and is keyed and pressed onto the pinion shaft. The gear ring is made of forged steel, heat-treated. The pinion and gear ring have accurately cut (or machined) teeth, heat treated to produce a combination of hardness and toughness. The gear table and hold-down ring, made of chrome nickel steel, are accurately machined, providing a close fit throughout and preventing misalignment dueto side thrust.

An oil reservoir provides constant oil lubrication to the table bearings. The construction of the gear table and base forms a sealed joint which excludes foreign matter from the oil reservoir.

The cone or ball table bearings of heat-treated steel, hardened and ground and accurately machined, insure free and easy operation of the table. The table bearings are held in place by heat-treated, accurately machined and ground steel races. The split pinion sprocket has ample adjustment for aligning with any make of drawworks.

The master bushing is of chrome nickel steel, accurately machined, providing snug fit at both inside and outside surfaces. A cast steel bushing retainer or "suit-



Super Duty four-speed drawworks.

case carrier" holds the bushing in position.

The Ideco Type B portable drilling rig is a fast drilling machine, powerfully constructed and of simple design. It is built to meet the demand for a heavy duty rig, capable of handling the various drilling conditions encountered in 3,000-foot wells, with reserve strength for deeper drilling in case of emergency. Features incorporated in the Ideco drilling rig, include a heavy structural steel frame, special steel bullwheels, patented removable gudgeons, fibre-faced friction wheel, adjustable calfwheel bearing for tightening calfwheel chain, tapered oversize wrist pin, Union-Ideco drive chain, heavy all-steel walking beam and a structural steel mast.

Of particular interest is the steel

Ideco 27½-inch oil-bath rotary.

frame. The members are of heavy cross section, designed especially to give lateral rigidity. All joints are welded.

The fiber-faced friction wheel is weatherproof and has a high coefficient of friction which transmits maximum power with minimum pressure. It is easily applied or removed.

The structural steel mast is of all-riveted construction. It is 65 feet 6 inches high, made in three sections. The walking beam is supported in the lower section of the mast. A wooden mast is furnished if desired.

The new Ideco 6-inch oilbath swivel

(Continued on Page 436)

NEW QUIMBY SUMP PUMP DOES NOT NEED PRIMING

The CP Quimby sump pump, a new piece of equipment made by the Chicago Pneumatic Tool Co., New York, is an air-operated pump driven by the CP No. 88 rotary air motor. This pump is sturdily built, weighs only 44 pounds and has a capacity of 100 gallons per minute at a 28-foot head. With the CP Quimby sump pump steady capacities may be obtained up to 50 feet. All that is necessary for this fast-pumping unit is to start the motor running before submersion and lower the complete unit into the manhole or pit to be drained and the water is immediately and steadily pumped out without priming.

The exhaust air from the motor serves to rid the manhole or pit from dangerous gases and fumes while pumping.

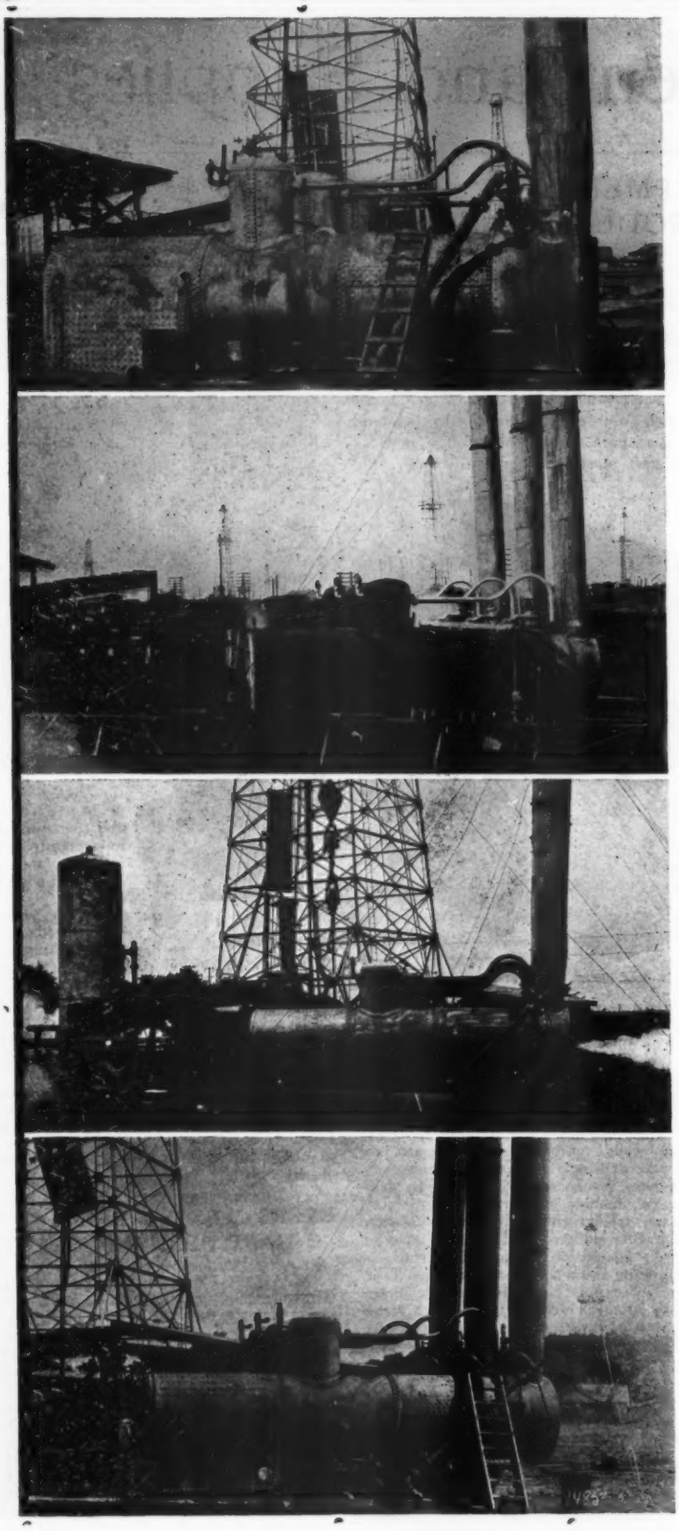
By using a 2½-inch water hose for an outlet and a three-quarter-inch air line, this tool can be easily taken from job to job, which eliminates the use of pipe or heavy reinforced hose.

The ease with which this pump may be transported makes it particularly adaptable for contractors and others in cases where water must be removed from manholes or pits before work can be started.

BYERS CLOSES GIRARD HAND PUDDLING PLANT

On August 15 A. M. Byers closed its Girard, Ohio, hand puddle mill, the largest single unit of hand puddle furnaces in the country. Gradually the Byers company has been consolidating its manufacturing of wrought iron in the Pittsburgh district, anticipating the opening of the new mill recently completed on the Ohio River just outside of Pittsburgh. This new mill will have an ultimate capacity of 45,000 tons a month compared with the Girard plant's 5,000 tons a month. The Girard plant was built in 1908 and, in addition to 88 puddle furnaces and plate mill, included a blast furnace which was dismantled in 1929. According to the United States Bureau of Standards, the wrought iron produced by the Byers new process has a highly refined base iron and very uniform distribution of iron silicate (slag).

The scale on which wrought iron can now be manufactured enables Byers to roll plate for pipe directly from the billet instead of piling and reheating muck bar. This should mean that pipe made from the new wrought iron will possess better bending and threading properties than those found in the hand puddled product. Although the principal finished product of the company is and probably will be for some time to come, wrought iron pipe, the new mill affords facilities for producing plate and bar iron.



SAVE

THE Oklahoma Field knows and appreciates Broderick equipment. Important drillers such as the Cambell & Parker Drilling Co., Loffland Brothers, the Noble Drilling Co., and Southern & Thermond Drilling Co. use Broderick Superheaters to secure the most efficient operation of the new piston valve type, roller bearing engines. Pictures at left show installations of Broderick Superheaters by drilling companies in the order named.

Reports from this Field, where Broderick Boilers were the first to be equipped with Superheaters, prove that actual operation has effected every economy which original tests predicted.

Ask a National Supply Man to explain the details of this principle of superheating . . . changing saturated steam into dry steam . . . and what it means in results.

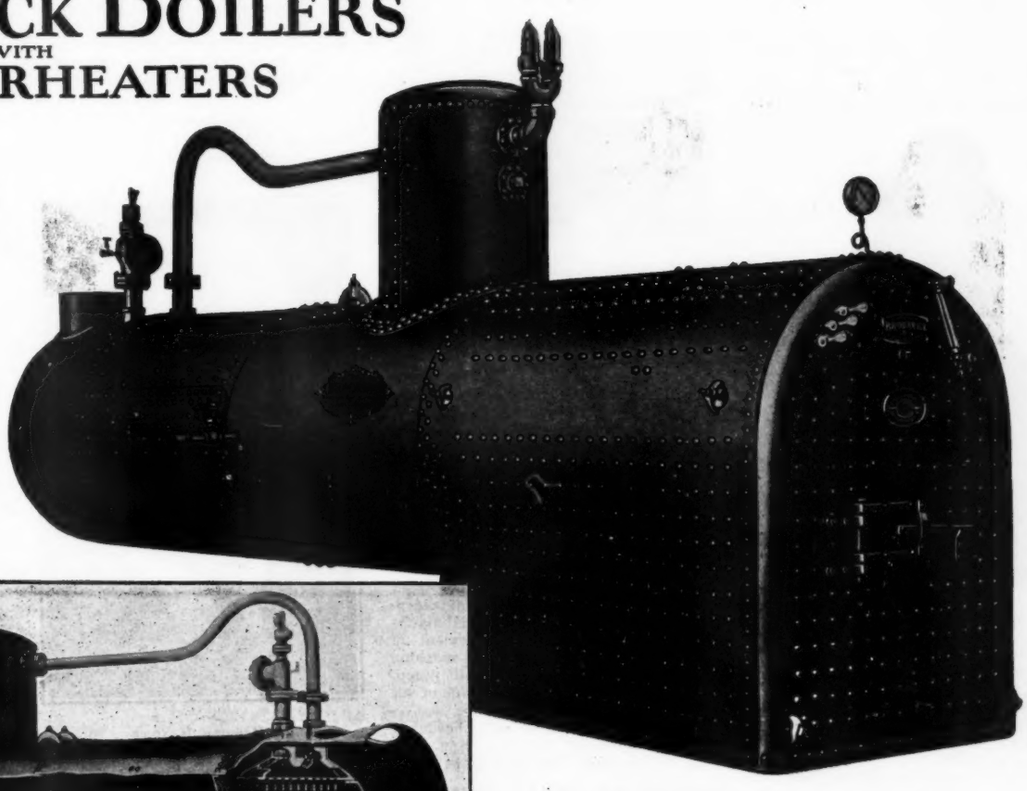
Equipment, Fuel, Water

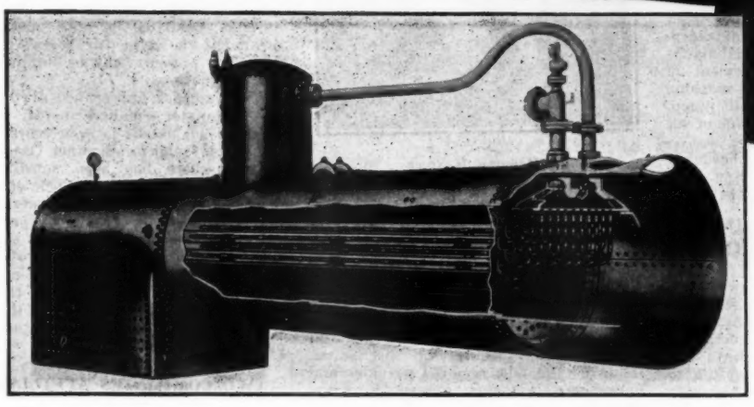
BRODERICK SUPERHEATERS have brought to oil well drilling what superheated steam engines have given to railway locomotives . . . increased steam capacity with smaller equipment . . . or a reserve capacity with available portable boiler sizes . . . and dry steam to make greater pump and engine speeds safe.

BRODERICK BOILERS

WITH ELESCO SUPERHEATERS

Continuing the reputation of Broderick Boilers for over fifty years.





At left—Cut-away view to show the flow of hot gases around tubes, changing saturated steam into dry steam.

Manufactured by

THE BRODERICK COMPANY, MUNCIE, IND., U.S.A.
Boiler Manufacturers

Oil Field Equipment and Supplies

GLOBE BIT DESIGNED TO EXCLUDE UNDERREAMING

The Globe expansion bit, a recent addition to the line of underground drilling equipment manufactured by Globe Oil Tools Co., Los Nietos, Calif., was designed primarily to eliminate underreaming. However, during a series of tests, another important use for this bit was discovered, provided a full-gauged hole was not required. It was found that by eliminating a considerable portion of the reaming edge, the side wall friction was reduced to such a point that more footage with less weight and faster drilling time was accomplished.

The manufacturers then decided to design two types of cutters—designated as "Type 1," for use when a maximum, full-gauged, oversized hole is desired without the necessity of underreaming, and "Type

2," for use when more footage with faster drilling time and with less weight is of more importance than a full-gauged, oversized hole. Due to the short reaming edge of the "Type 2" bit, it is asserted that the cutters actually decrease in diameter down to a point somewhat over the desired size of the hole wanted as they become dull.

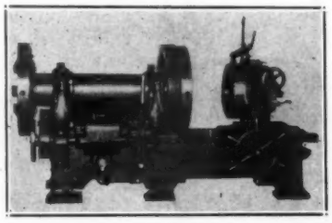
The Globe expansion bit is simple in design, the only moving parts being the two cutters. The expansion is accomplished by a lateral, upward movement of the cutters due to weight being applied. These cutters are held in place by a cylindrical rib operating in a groove in the head, running approximately on a 30° angle from the vertical. The only function of the through bolt is to carry a part of the actual weight of the cutters when they are in a contracted position. Since there is no wear on the bolt it can be used indefinitely, it is said. The tooth design on this bit is practically identical with that of the Globe Model "B-2" drilling bit.

The collapsed position of the bit is usually about 1 inch under the diameter of the pipe or hole through which it passes, and due to this it is never necessary to do any reaming in order to get on bottom. This advantage is said to hold true of both types of the Globe expansion bit.

At the American Gas Association convention in Atlantic City, N. J., October 13 to 17, the Bailey Meter Co., Cleveland, Ohio, will exhibit Bailey automatic ratio control as applied to the mixing of gases and to the mixing of gaseous fuel with air to gain the highest combustion efficiency consistent with the economical operation of open hearth and other types of industrial furnaces.

BIGNALL & KEELER PIPE MACHINE HAS 8 SPEEDS

The No. 8 Duplex Improved pipe-threading and cutting-off machine, made by the Bignall & Keeler Machine Works of the Nelson Manufacturing Co., Edwardsville, Ill., is designed to cut and thread pipe and casing from 2½ inches to 8¼ inches. It is equipped with Peerless sliding die-head, with expanding dies. Screw adjustment is provided for accurate setting of dies to proper size. A positive locking arrangement takes strain from the adjusting screw, and insures duplicate threads. The heavy bed casting rests



directly on the foundation. It is strongly braced and has suitable provision for mounting working parts of the machine. The lower half of the gear-box is a part of this bed casting.

Eight speed changes are provided through broad-face steel-cut gears, running in oil, in a compact gear-box. A two-way positive clutch is mounted on the bed shaft. This clutch has both fast and slow positions, and provides a quick stop and start for the machine, and also enables the operator to shift quickly to the higher speeds for cutting off operation on large pipe sizes. Power is transmitted to the revolving parts from below.

A three-jaw independent chuck is mounted on each end of the arbor, each jaw having a tempered tool steel gripper which can be readily removed for sharpening. The rear chuck has special flange grippers, which is found convenient in making up flanged fittings. The machine is furnished with a geared oil pump, which provides a constant stream of oil for the dies and cutting-off tool.

Self-centering V jaws with hardened faces are provided for steadying pipe when cutting off, reaming and beveling.

COMPOUND SEALS JOINTS AND ARRESTS CORROSION

The Quigley Co., Inc., New York, manufacturer of Hytempite and Triple-A protective coatings, announces the manufacture of a plastic, expansive compound for sealing joints, called Q-Seal. The compounding of this material is said to have been made possible by the discovery of a material, a phenomenon of nature, which is not only a natural lubricant and preserver of metal, but when subjected to heat expands to several times its normal volume. This material is ground to a very fine mesh and used as the principal pigment in the compounding of Q-Seal. The principal vehicle or mixing agent used is impervious to crude oils, all of their derivatives, acids, etc., and is noncorrosive.

Q-Seal is applied to joints to be sealed with a brush. The expansive qualities fill imperfections in threads, flanges or gaskets. The compound is said to seal joints leakproof and to prevent rust and corrosion. Joints fabricated with it are said to be broken with ease regardless of age or conditions to which they have been subjected.

The Michigan Valve & Foundry Co., Detroit, Mich., has prepared an eight-page bulletin in colors descriptive of the Michigan "screw-lift" valve.

PIPE-WRAPPING DEVICE OFFERED BY RESISTCOR

A pipe-wrapping machine, which applies felt to pipe lines at the rate of 30 feet of line a minute, is a recent contribution to the oil and gas industry by the Resistcor Engineering Corp. of Tulsa. It is said to do the work of six to eight men and to make a perfect wrap.

The machine is made in two models. Model A, for wrapping 2-inch to 10-inch lines, inclusive, is hand operated. Model B, for lines 12 inches or more in diameter, is operated by a one-cylinder, two-cycle, air-cooled engine consuming an average of three quarts of gasoline in 10 hours. Only two men are required to operate either model at maximum capacity.

A marked advantage of the Resistcor pipe-wrapping machine is the ease with which its crew of two can put it on or

Herman Kramer

remove it from a line. Either operation requires the manipulation of only four bolts and can be performed in 10 minutes or less. The larger model passes over Dresser couplings without being removed from the line.

Those who have seen demonstrations of the machine say it makes a neat, taut, uniform wrap. A wiping mechanism, following the felt, removes wrinkles and unevenness, assuring a smooth wrap. Rubber-surfaced wheels on the line truck protect enamel-coated lines from damage. On bends and sags the machine's work is the same as elsewhere, the only variation being that the lap of felt is slightly wider than on straight line.

The Resistcor pipe-wrapping machine was invented and perfected by Herman Kramer and K. H. Burton, both of whom are familiar with pipe line requirements as a consequence of long experience in the industry.

The machine was tested thoroughly before it was announced to the industry. In its first actual field tests, one of the Resistcor machines is reported to have operated steadily for four months without giving trouble or requiring repairs. Other Resistcor machines in field service are said to be duplicating that record.

The machine is rented by the corporation which promises prompt service regardless of where the equipment may be used.

FLUCTUATION PREVENTED BY NEW TYPE REGULATOR

A constant line pressure free from any fluctuation is most desirable for good results in oxwelding. The Oxweld type R-43 oxygen welding regulator, recently introduced by Oxweld Acetylene Co., 30 East Forty-second Street, New York, assures freedom from fluctuation by means of a system of two-stage pressure reduction. This two-stage reduction is accomplished through two separate and independent sets of diaphragms, valves and

springs. The full cylinder pressure of 2,000 pounds enters the regulator through a stem-type valve and is controlled by the first stage diaphragm. In this stage the pressure is reduced to less than 250 pounds per square inch. This pressure will be constant for any one regulator, but varies somewhat with different regulators. The pressure here is nonadjustable.

The oxygen then passes from this first reduction assembly to a second stem-type valve and diaphragm assembly, where the pressure is reduced to the working pressure desired by the operator. This pressure is regulated by the operator by means of the adjusting screw, and any operating pressure may be obtained without fluctuation.

The external appearance of the Type R-43 regulator should be noted. Instead of the usual handle type pressure adjusting screw found on all other Oxweld regulators, there has been substituted a screw with a ribbed cap. This change in design not only presents a neater and more compact appearance but will also reduce likelihood of breakage as there are no projections on the handle to be bent accidentally. This new type adjusting screw is of smaller diameter than the body of the regulator itself, so that it is easier to pack for transportation from one job to another.

TWO COMPANIES AFFILIATED

The Boiler Engineering Co. of Newark, N. J., announces its affiliation with the Plibrico Jointless Firebrick Co. of Chicago, manufacturer of Plibrico furnace lining. The Boiler Engineering Co. manufactures and installs the Beco-Turner baffle and the Turner baffle. Both baffles will now be marketed through the Plibrico representatives in over 100 cities in the United States and Canada. The refractory material used in the construction of these baffles will now be formulated from the clays used in the manufacture of Plibrico furnace lining at the Plibrico plants in Chicago, Trenton, N. J., and Firebrick, Ohio. The Boiler Engineering Co. will continue to maintain headquarters in Newark and the main offices of the Plibrico Jointless Firebrick Co. will remain in Chicago.

The Hughes Tool Co. opened its new shops in Midland, Tex., Saturday, September 13.

TO REFINERS OF PETROLEUM

THE Pratt vapor phase cracking process offers a method of producing a natural antiknock blending fluid from crude oil distillate or fuel oil.

This blending fluid added to an equal quantity of straight run gasoline will make a gasoline of commercial antiknock rating.

HEADQUARTERS DURING THE TULSA EXPOSITION 214 SOUTH CHEYENNE STREET

The cost of producing Pratt's blending fluid is comparable with operating costs of contemporary cracking processes.

A demonstrating unit is in operation and open for inspection.

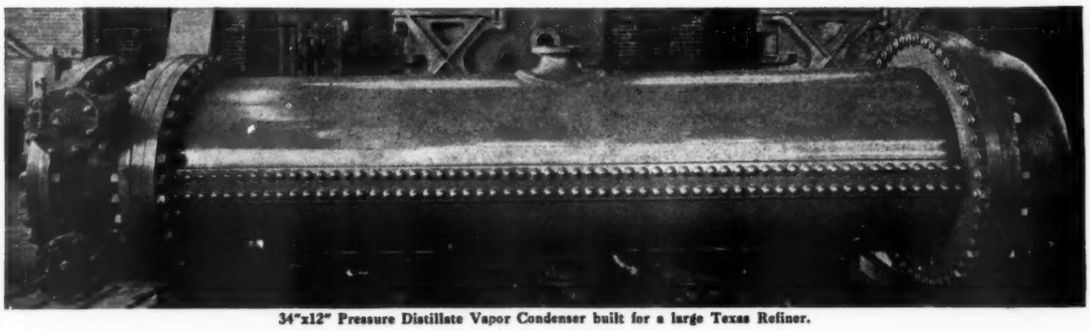
The process has been developed to meet the requirements of the manufacturer of automotive distillates.

The industry's investigation of this successfully developed process is invited.

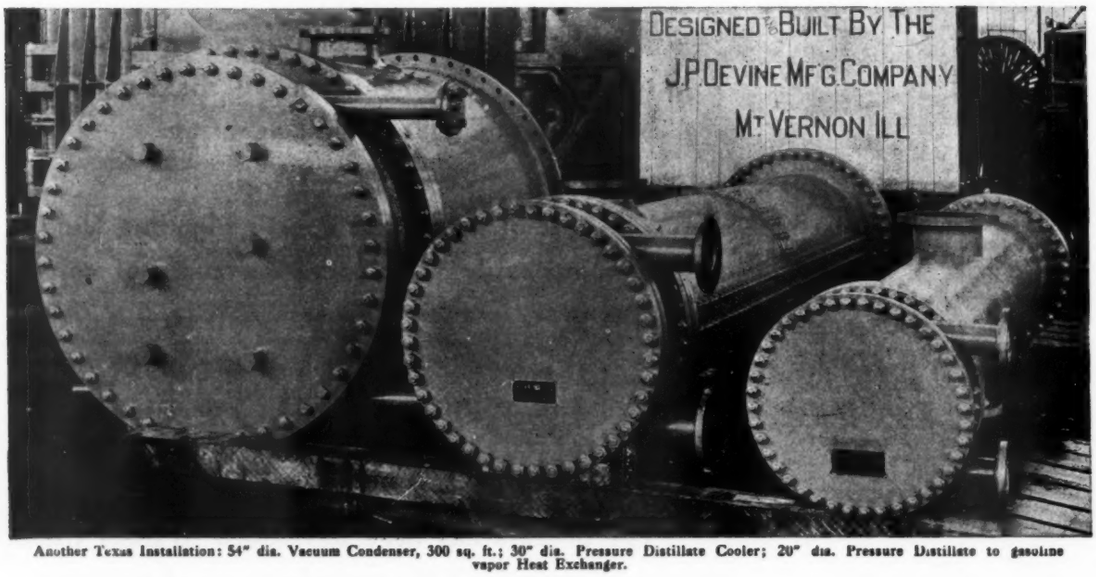
The Automotive Distillate Corporation

Licensors of the Pratt Vapor Phase Cracking Process
Continental Life Building
ST. LOUIS, MO.

We are Fabricating and



34"x12" Pressure Distillate Vapor Condenser built for a large Texas Refiner.



Another Texas Installation: 54" dia. Vacuum Condenser, 300 sq. ft.; 30" dia. Pressure Distillate Cooler; 20" dia. Pressure Distillate to gasoline vapor Heat Exchanger.

Rectifying Column, 4'x60', built for an Ohio Refinery.

Headquarters during the Tulsa Exposition, 214 South Cheyenne Street

Sales Representatives

For the Pratt Vapor Phase Cracking Process Equipment

IN the announcement on the preceding page the Automotive Distillate Corporation presents a new and sensationally successful cracking process for the production of a natural antiknock blending fluid.

As sales agents of the leased rights and fabricators of the equipment the J. P. Devine Manufacturing Company offer unusual plant facilities which are reflected in low costs and speedy completion of all contracts. Your commissions are executed "From Blue Print to Shipment Under One Roof". We will be glad to have our engineers present the details of the Pratt Vapor Phase Cracking Process and show you, too, some remarkable plant economies which are reflected in the equipment costs. The J. P. Devine Manufacturing Company specializes in the heaviest plate work.

Charles P. Devine
Pres.

J. P. DEVINE MANUFACTURING COMPANY, Inc.
MT. VERNON, ILL.

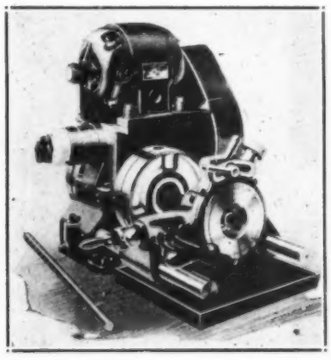
Sales Agents and Fabricators for the Automotive Distillate Corp., of St. Louis

NEW YORK **ST. LOUIS** **CHICAGO** **HOUSTON**

Oil Field Equipment and Supplies

MACHINE CUTS THREADS ON PIPE IN FAST TIME

The "Tom Thumb" pipe machine, said to be the smallest complete pipe machine on the market, has just been announced by the Oster Manufacturing Co. and the Williams Tool Corp. of Cleveland, Ohio, and Erie, Pa. While the machine will cut off, threat, ream and chamfer all sizes of pipe from one-quarter inch to 1¼ inches, its overall dimensions are only



18½ inches in height, 16 inches in width and 23½ inches in depth. Included in these dimensions is the one-half horsepower domestic electric universal motor that automatically adjusts its speed to the pull on the dies.

According to the manufacturers, tests have been made which show that the "Tom Thumb" pipe machine will put a standard thread on a 1¼-inch pipe in 18 seconds, and on a one-quarter-inch pipe in 12 seconds. The actual floor-to-floor time, including chucking, threading, reaming, cutting off and removing the pipe from the machine, is said to require only 1 minute and 17 seconds for 1¼-inch threads, 58 seconds for one-half-inch threads and 45 seconds for one-quarter-inch threads.

The machine was designed for the average plumbing shop. However, a special bolt chuck has been designed for use with the machine, that makes it possible to thread bolts from three-eighths inch to 1½ inches, making the machine adaptable for small machine shop use. The machine is said to be quiet and smooth in operation, the motor power being transmitted to the machine by a double "V" belt. The "Tom Thumb" is built of heavy, close-grained cast iron and uses Timken roller bearings throughout. It is equipped with a cutting-off and reaming attachment and a reversible snap switch.

NEW TRANSFORMER ANNOUNCED

A new type of instrument current transformer embodying compensating features which practically eliminate ratio and phase angle errors and bearing the designation WF-1 has been announced by the General Electric Co. The new transformer, built in ratings from 5 to 800 amperes and designed for 5,000-volt operation, is for use in connecting watt-hour meters, instruments and relays, the combined burden of which does not exceed 50 volt amperes. It has practically straight-line accuracy down to 5 per cent load. The new transformer supersedes the WC-12 with which it is interchangeable as to dimensions. It is arranged for either flat surface or pipe mounting, with a base which affords great accessibility. Two bolt hole terminals are employed on this new transformer.

SAVINGS ARE EFFECTED BY WASTE HEAT BOILER

Conservation of heat has become more and more important with the increasing cost of fuel. Power plants and industrial works which formerly exhausted large quantities of hot gases to the atmosphere are finding it a great economy to conserve much of the heat which previously was lost. The Foster Wheeler Corp., New York, has developed a waste heat boiler which differs from similar products used in the past.

The boiler consists of heating elements built of seamless steel tubes covered with cast iron extended surface, reamed to size and shrunk on the heating tubes.

Several of the boilers have been in operation for more than a year. The first installations were made in connection with the exhaust gases from Diesel engines. It has been found that in this service the boilers act as excellent mufflers, no additional muffling devices being used under ordinary conditions.

Another interesting departure from usual boiler practice is that when operated with waste heat gases not exceeding 800° F., it is not necessary to bypass the boilers for protection, even when dry. Repeated tests in operation have shown that the boilers are not damaged when used as mufflers alternately with and without water.

The boilers thus may be run as flash boilers, the steam production being controlled by setting the feed valve for the desired steam quantity. A further characteristic of interest to operators is the self-cleaning tendency, it having been found that the exhaust gases from Diesel engines tend to keep the heating surface clean so that soot blowing is eliminated when operating on exhaust gases from internal combustion engines.

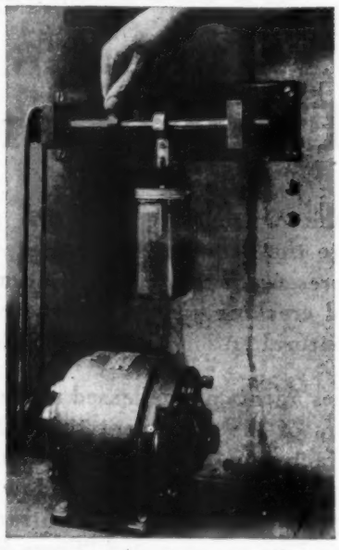
VICKERS BUYS PATE WORKS

The Vickers Machine Works, Smackover, Ark., has purchased the Pate Machine Works, Oklahoma City, and plans to do a general line of repairing of oil-field tools and equipment. Vickers will enlarge the Pate plant, installing new equipment and in addition to its other work plans to manufacture and distribute the Vickers releasing and circulating overshot.

NEW BEARING METAL IS MADE BY WESTINGHOUSE

A remarkable new bearing metal in the form of a self-lubricating bearing has been invented by W. C. Wilharm of the Westinghouse Research Laboratories. It has been estimated that these bearings increase efficiency 10 times. They can be used also with lubricant. If the supply, or film, of lubricant should become inadequate for any reason this bearing resists the heating action of friction by means of its own lubricating qualities.

After this metal has been placed on a production basis and the cost reduced, it



Self-lubricated bearing on test at Westinghouse Research Laboratories

may effect a marked change in the construction of bearings wherever they are used—whether in delicate instruments or in automobiles, airplanes, electrical apparatus and various kinds of oil-field machinery.

This new bearing is the result of countless tests in the Westinghouse Research Laboratories to determine what materials reduce friction most. When these were discovered, it was found that they could not be incorporated in an oil, so they were put in the bearing itself. The bearing is made by mixing one or more metallic powders with one or more materials yielding a soapy substance. The ingredients are put in a cold mold and subjected to a pressure of approximately 40,000 pounds per square inch. The temperature is gradually raised until it reaches about 400° F.—nearly twice that required to boil water. After keeping the mold at this temperature for half an hour, the pressure is raised to 200,000 pounds per square inch. The pressure is then released and the mold allowed to cool. After this, the bearing is removed from the mold.

Bearings made of this new material can either be made to certain specifications according to the mold used or they can be made in blank and machined to the size desired.

JENKINS BROS. BRING OUT NEW BRONZE VALVE

Jenkins Brothers, New York, have brought out a new line of standard bronze valves with the one-piece screw-over bonnet and "slip-on, stay-on" disc holder. The valves are made in globe, angle, cross and check types for all standard services. The globe valve is designated as Jenkins Figure 106-A.

The one-piece screw-over bonnet in combination with the slip-on stay-on disc holder is a new departure in bronze valve design. The one-piece bonnet construction provides ease in removal, and contributes unusual strength, which, it is said by the manufacturer, prevents springing or distortion, even though the bonnet is removed and replaced repeatedly. The valve throughout is heavily proportioned.

The slip-on disc holder facilitates changing the disc. If the spindle is raised just a turn or so, the bonnet can be removed from the valve body without danger of the disc holder slipping off the spindle. Then a turn or so in the opposite direction and the disc holder slips off the spindle.

N. S. CATALOG A HANDBOOK

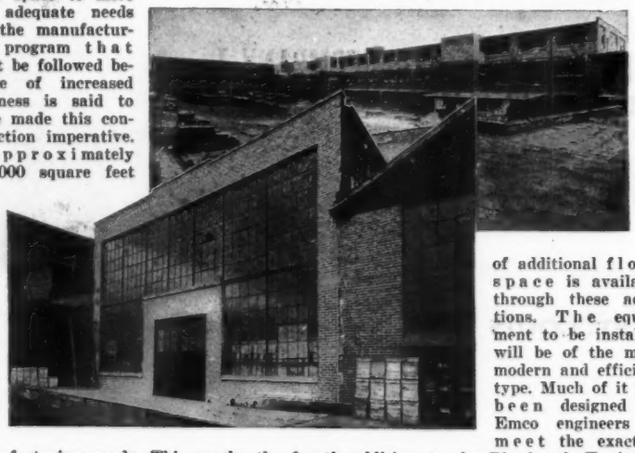
Besides describing and illustrating virtually every modern piece of oil field equipment, the 1,050-page catalog issued by the National Supply Cos., Toledo, Ohio, is an oil industry handbook of unusual usefulness. Under the head of "General Information" the catalog presents a compendium that includes the history and origin of petroleum and natural gas, material required to build rigs, statistics showing wells drilled in the United States and the world's production of petroleum, method of finding specific gravity of oil and the pressure and volume of gas, weight and pressure of water, weights and measures, etc. Some idea of the number of subjects covered and of the completeness of the book's list of oil country appliances may be obtained from the fact that the index requires 38 pages.

X-RAY PLANT INSTALLED

The St. John X-Ray Service Corp., New York, has installed what is said to be the first X-Ray plant of its kind at the Barberton, Ohio, works of the Babcock & Wilcox Co. The photographic apparatus will be used primarily for routine inspection of welded seams in pressure vessels, heat exchangers and similar equipment.

PITTSBURGH EQUITABLE METER CO. ADDS TO ITS PLANT

Work has been completed on two new additions to one of the great Pittsburgh Equitable Meter Co. plants in Pittsburgh, Pa. The necessity of again increasing the floor space to meet the adequate needs for the manufacturing program that must be followed because of increased business is said to have made this construction imperative.



Approximately 100,000 square feet of additional floor space is available through these additions. The equipment to be installed will be of the most modern and efficient type. Much of it has been designed by Emco engineers to meet the exacting manufacturing needs. This marks the fourth addition to the Pittsburgh Equitable Meter Co. plants within two years.

Technical Questions Answered

BY CHARLES K. FRANCIS, PH.D. TECHNICAL EDITOR

This department of The Oil and Gas Journal is devoted to the manufacturing branches of the oil industry.

Those connected with the refining of crude petroleum, the manufacture of natural gasoline and closely allied industries are invited to submit their problems to Dr. C. K. Francis, technical editor. The department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in the various phases of plant operation; also those connected with the marketing and utilization of petroleum products.

Questions should be submitted in as much detail as possible so as to assure a satisfactory answer.

All inquiries should be signed and if other than the given initia's are to be used please indicate the desired letters.

Questions involving patented processes, intricate formulas and calculations and estimates of costs, for obvious reasons, cannot be answered. The replies will appear on this page within a reasonable time.

ANALYSIS OF HEALDTON CRUDE

I wish to obtain information covering the analysis of oil produced in the Healdton, Oklahoma, Field during the early days of the development there. Can you supply this information?—H. K. W.

Bacon and Hamor, The American Petroleum Industry, page 496, quotes the analysis, an average of 20 samples, of the Healdton oil reported by I. C. Allen of the United States Bureau of Mines, in 1914. This follows:

Specific gravity at 15° C.	0.8666
Corresponding A.P.I.	31.8°
B.t.u. per pound	19,414
Viscosity at 20° C. Engler	3.0
Water	trace
Sulphur, per cent	0.7
Gasoline, per cent by weight (57.7°)	6.0
By volume (54.4°)	7.0
By weight (54.4°)	11.2
Kerosene, per cent by weight (42.2°)	28.8
By volume (41.3°)	20.2
Lubricants, per cent by weight (29.9°)	29.7
By volume (33.4°)	29.4
By weight (33.4°)	33.1
Residue, per cent by weight	34.4
Loss, by weight	1.1

FILTER AIDS WHEN DEWAXING

How are filter aids used? Are they for the purpose of improving color or for removing wax? Are filter aids used in the preparation of all grades of lubricating oil?—C. D. H.

Filter aids, in a general way, are those solid materials that are mixed with a semiliquid to be filtered for the purpose of assisting filtration. Colloidal substances, gum, and amorphous wax, for example, tend to clog the filter so that no liquid will pass through and certain inert substances have been found that, when mixed with the liquid to be filtered, prevent such stoppage. Charcoal, coke, crushed rock, sawdust, and other materials have been used in different industries. Certain forms of earths have found favor for the filtering of petroleum oils.

The purpose of these earths has been more to assist in the removal of small quantities of wax than for the main purpose of improving the color of the oil. It has been the practice to use filter aids when manufacturing the heavier lubricating oils, such as bright stock.

While there are several steps in the process that may permit the introduction of the earth, it is considered good practice to introduce the filter aid after the oil has been treated, filtered, blended with naphtha, and chilled to about —30° F. The filter aid is thoroughly mixed with the oil, while the low temperature is maintained by means of a brine coil in the mixing tank, and the mixture pumped to a continuous filter of the revolving type. The wax free oil is drawn through the meshes of a revolving cloth drum. The filter aid with the adhering wax is retained on the cloth from which it is scraped off continuously. This filter cake is conveyed to the recovery system, where it is heated, pressed, washed with naphtha, dried, and then returned to the system to be used again.

SOLVENTS FOR PAINT REMOVERS

Could you give me the details covering the special kind of gasoline or naphtha used in making up a liquid for the removal of paint and varnish?—T. R. E.

There are numerous mixtures that are used for the removal of paint and varnish to replace the former methods of burning off and treatment with alkaline substances. These solvents act quickly with no action on wood or metals and the better grade removers are usually mixtures of alcohols, turpentine, naphtha, amyl acetate, acetone, benzol, ether, nitro benzol. Many of these substances have no action on paint or varnish when used alone but the solvent property is obtained by proper combinations.

Petroleum naphtha should evaporate rapidly, should leave no stain, and must be free from color. As the same type of naphtha is largely used as a paint thinner it should be free from any strong odor. For this reason the specifications usually require that the product shall be doctor sweet and are further supplemented with a requirement that the odor shall be sweet.

The gravity of petroleum naphtha suitable for a thinner or solvent may vary from about 48 A.P.I. to 58 A.P.I. Initial boiling point from 200° F. to 300° F., and the endpoint is seldom over 400° F.

One of the best known naphthas is called Stoddard Solvent, for which this specification may be used:

Must be free from water and suspended matter.

Color—Water white.

Doctor test—Negative.

Unsaturated hydrocarbons—Not more that 2 per cent soluble in concentrated sulphuric acid.

Distillation—Initial not less than 300° F.; endpoint not above 400° F.

Acidity—The residue remaining in the flask after the distillation shall show no acid reaction.

Aromatics—Shall not contain aromatic hydrocarbons, such as benzol, toluol, and others.

Odor—Shall be sweet.

Flashpoint—Shall not be lower than 105° F., closed cup test.

TRANSFORMER AND SWITCH OILS GERMAN SPECIFICATIONS

We have a request for the German specifications for transformer and switch oils and would appreciate it if you could furnish these?—E. C.

Specifications for transformer and switch oils, as suggested by German electrical manufacturers, may be found in Holde-Muellar, Hydrocarbon Oils, 2nd Ed., page 161. A summary of these includes: Only clean refined mineral oil shall be used. Specific gravity at 15° C. between 0.85 and 0.92. Viscosity not above 8 Engler. Flash and fire, open cup, not under 150° and 180° C. respectively. Freezing point should not be above —20° C. After cooling in a test tube 15 mm. by 4 cm. one hour at —20°, the oil must still be liquid and clear when inverted.

The loss on heating at 100° for five hours must not be over 0.4 per cent. The oil should be free from acid, alkali, sulphur and absolutely free from moisture. The oil should be clean; suspended material must not be present. After passing a stream of oxygen for 70 hours through the oil heated to 120° C., the oil must still be clear and completely soluble in 70° naphtha. The tar value should not be greater than 0.1 per cent.

CARBON BLACK MANUFACTURE ARTICLES

Would you kindly give me some references to articles giving a description of methods of manufacture and other information about carbon black?—E. R. L.

Numerous articles about carbon black have appeared in The Oil and Gas Journal and possibly if you will refer to the articles that have appeared during the past several years you will find the desired information. The more important of these are listed:

	Date 1930	Page
Record on Carbon Black	1-16	139
Carbon Black Production and Use	1-30	100
Columbian Carbon Co. Reports on Operations	4-3	94
Seeking to Increase Yield of Carbon Black	4-24	96
Carbon Black Production in 1924 Was 47 Per Cent Above That of 1923	5-1	76
Bredberg, L. E.—Carbon Black Overproduction New Threat in the Permian Basin	5-22	102
	Date 1929	Page
Carbon Black Exports	1-31	88
Cabot, Thomas D.—Bulk of Carbon Black Made From Residue Gas of Gasoline Plants	5-2	78
Carbon Black Industry Shows Gain in Production and Sales	6-13	96
Carbon Black Expanding Production	6-20	84
Carbon Black Imports	9-5	84
	Date 1928	Page
Carbon Black Industry Showed Material Expansion in 1927	5-31	66
New Smokeless Carbon Black Plant	12-6	237
	Date 1927	Page
Hopkins, G. R.—Carbon Black Important Industry	6-9	70
Carr, Reed L.—Carbon Black a Vital Business	6-16	G-198
Origin and Development of the Carbon Black Industry	10-13	68

NATURAL GASOLINE PRODUCTION

I am interested to know the total capacity of the plants manufacturing natural gasoline, with the number, if possible, now in operation. What is the largest plant and what companies are the most important factors in natural gasoline production?—C. M. T.

A survey of the natural gasoline industry was made in The Oil and Gas Journal of May 22, 1930. Many details may be obtained from the several special articles published in that issue. See especially the article by C. O. Willson, page 114.

As of May 1, this year, there were 1,071 natural gasoline plants in the United States with a total daily capacity of 9,542,020 gallons. The largest single plant is that of the General Petroleum Corp. at Santa Fe Springs, Calif., which is reported to have a daily capacity of 190,000 gallons.

The Phillips Petroleum Co. is the largest manufacturer of natural gasoline, with 44 plants in the Mid-Continent listed May 1, 1930. Their capacity was 1,163,000 gallons daily. This is more than twice the rated capacity of any other company. The Standard Oil Co. of California, through its subsidiary, the Standard Gasoline Co., is next with 39 plants having a daily potential output of 508,750 gallons. The Sinclair Oil & Gas Co. has 16 plants with a rated capacity of 403,000 gallons daily. It is the largest natural gasoline manufacturer in Oklahoma.

The combined output of the Shell Oil Co. of California and the Shell Petroleum Corp., representing the Dutch-Shell interests, amounts to 439,000 gallons a day from 20 plants. This places this unit third in the United States.

There are two operating units of The Texas Company: The Texas Company of California and The Texas Company of Delaware. These make over 400,000 gallons a day.

Among the other large producers of natural gasoline are Empire Oil & Refining Co., Skelly Oil Co., Union Oil Co., Magnolia Petroleum Co., General Petroleum Corp., Signal Hill Gasoline Co., Indian Territory Illuminating Oil Co., Gulf Companies and Norwalk Oil Co. East of the Mississippi River the Hope Construction & Refining Co. leads with 44 plants producing 294,700 gallons daily.

According to the United States Bureau of Mines, the largest daily production of natural gasoline last year was 6,700,000 gallons. This was made in October.

FOREIGN REFINERIES AND EXPORT

I am desirous of obtaining the following information: List of references regarding oil export trade covering the following points in particular—Names of the different foreign refineries, whether these are independents or not and amount of crude used by each. What countries give monopoly? Is price of export to above refineries based on current market price of like grade in the United States? Price of export oil delivered, showing cost of crude and itemized export expense? Usual period of contract? Average capacity of tankers?—F. M. C.

The foreign petroleum refineries are located in about 40 different countries, the number of refineries in each country varying from 1 to 60. Argentina is reported to have 15 refineries in operation; Canada has 16; Czechoslovakia has reported 11; there are 34 in Germany; 18 were reported for Mexico; there are 52 plants in Poland with only 27 in operation during the last half of 1928; Rumania appears to have the greatest number with 60 listed. Most of the foreign plants are independents, though some are government owned and Spain has granted a monopoly to "Campsa." This monopoly is the only body empowered to import petroleum products, and instead of paying tariff duties it pays part of its profits to the government. A list of foreign refineries with details may be found in Trade Information Bulletin No. 623, Department of Commerce. This may be obtained from the Government Printing Office, Washington, D. C., for 10 cents.

The price of export oil is in general based on the current market price for similar oil in the United States. The handling cost for export oil at Gulf ports is a minimum of 15 cents and the freight to European ports about 80 cents a barrel. The period of contract varies.

The usual tanker runs around 10,000 to 12,000 tons with the largest reported to have a capacity of 18,000 tons, equivalent to approximately 125,000 bbls.

For additional information, consult Petroleum Facts and Figures, a report of the American Petroleum Institute.

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WILDCAT OPERATIONS IN OKLAHOMA

(Continued from Page 96)

Nelson et al's No. 1 Strickland, NE NW Sec. 10-4-3w ..Shut down 2,880 ft.

GREER COUNTY

French's No. 1 Murphy, SW NW SE Sec. 23-7-21w .....Shut down 100 ft.
I. T. I. O. et al's No. 1 fee, C SW NE Sec. 17-6-24w ....Shut down 2,485 ft.

HARMON COUNTY

Harmon-Tex Oil Co.'s No. 1 Hoadley, NE cor. Sec. 17 4-24w .....Fishing 2,380 ft.
S. M. Stauffer's No. 1 Castleman, SW NE Sec. 8-4-26w..Shut down 625 ft.

HARPER COUNTY

Empire's No. 1 Bruce, C NE SW, Sec. 12-25-20w .....Drlg. 6,525 ft.
Sinclair Oil & Gas Co.'s No. 1 Howell, C SW SW Sec. 14-26-24w .....20,000,000 ft. gas 5,350-5,400 ft.

HASKELL COUNTY

I. T. I. O.'s No. 1 Blake, SW NW Sec. 3-10-21 .....Spudding.
Mid-Western's No. 1 Polster, C NE SE Sec. 33-10-22 ....Drlg. 4,040 ft.
Holden's No. 1 Phillip, SE cor. Sec. 3-9-18e .....Shut down 1,860 ft.
Marion Oil's No. 1 Sanders, NW NE NW Sec. 10-9-18e..Shut down 2,387 ft.
Sanboise Gas' No. 1 Unknown, SW NW SE Sec. 32-9-21e..Shut down 2,100 ft.

HUGHES COUNTY

Wright et al's No. 1 Ott, SE SW Sec. 15-5-11 .....Shut down 1,645 ft.
Canady et al's No. 1 Kanard, NW SW Sec. 29-9-12 ....1,000,000 ft. gas 2,284 ft.; shut down 4,515 ft.
Irwin et al's No. 1 Jones, SE NW Sec. 30-5-10 .....Drlg. 4,270 ft.

KAY COUNTY

Blackwell Oil & Gas Co.'s No. 1 Harshman, Sec. 2-26-1w..Rig on ground.
Boucher Oil Co.'s No. 1 Jefferson, NE SW Sec. 32-26-1w .....Drlg. 970 ft.
Aleo Royalty Co.'s No. 1 Wolf, SE SW SE Sec. 34-26-2w..5,000,000 ft. gas 4,390-4,420 ft.; shut down.
Blankinship Petroleum Co.'s No. 1 Hansen, SW NW SW Sec. 17-27-2 .....Sand 3,590-97 ft.; swabbed 34 bbls. after 40-qt. shot; flowed 34 bbls. and shut down.

KINGFISHER COUNTY

Prairie and Slick's No. 1 Wright, C NW SW Sec. 23-15-5w .....Drlg. 4,700 ft.
Galt Brown's No. 1 Wolf, NW SE Sec. 6-16-7w .....Cleaning out 6,015 ft.

KIOWA COUNTY

Riley et al's No. 1 Grebb, SW NE Sec. 6-7-16w .....Fishing 998 ft.
Red Bank Oil Co.'s No. 1 fee, SE SW NW Sec. 23-9-24..Drlg. 6,260 ft.; top Wilcox 6,-128 ft.

LATIMER COUNTY

Limestone Oil & Gas Co.'s No. 1 Murray, NE cor. Sec. 25-5-18 .....Shut down 1,700 ft.

LINCOLN COUNTY

Atlantic Oil Prod. Co.'s No. 1 Parker, SE NW Sec. 5-14-6 .....Drlg. 4,473 ft.

LOGAN COUNTY

Slick & Ramsey's No. 1 Jones, SE NW Sec. 24-17-2w ....Drlg. 4,895 ft.
Prairie and Slick's No. 1 Morgan, NW NE Sec. 33-16-1w .....Drlg. 5,575 ft.
Eason Oil Co.'s No. 1 Young, C SW NE SW Sec. 34-17-4w..Drlg. 4,624 ft.

McINTOSH COUNTY

Patterson et al's No. 1 Smith, SW cor. NW SE Sec. 32-9-16 .....Shot 240 qts. 5,446-5,559 ft.; shot went off up hole; fishing.

McCLAIN COUNTY

Prairie's No. 1 Parkinson, SW NW Sec. 22-7-2w .....Rig.

MUSKOGEE COUNTY

I. T. I. O.'s No. 1 Lacey, SE NW Sec. 31-12-19 .....Drlg. 280 ft.
Sioux Oil Co.'s No. 1 Unknown, NW SE Sec. 21-11-19 ..Shut down 1,011 ft.

NOBLE COUNTY

Barnsdall's No. 1 Miksch, NW SW Sec. 12-21-1 .....Drlg. 1,070 ft.
Weaver & Craigin's No. 1 Frederick, C SW NE Sec. 4-24-1w .....Shut down 2,425 ft.

OKFUSKEE COUNTY

Henry Oil Co.'s No. 1 Harjo, Sec. 36-12-9 .....Fishing 4,090 ft.
E. L. Robinson's No. 1 Rice, NW Sec. 2-10-9 .....Location.
Shepard et al's No. 1 Nevens, SE NW SW Sec. 3-12-10..Shut down 3,661 ft.

OKLAHOMA COUNTY

L. C. Hivick's No. 1 Sunset Addition, NW SW NW Sec. 17-11-3w .....Shut down 5,515 ft.
Mid-Kansas Oil & Gas Co.'s No. 1 Messer, SW cor. Sec. 32-14-3w .....Wilcox 6,697-6,771 ft.; shot with 90 qts. and 140 qts.; flowed 700 bbls.
Prairie and Slick's No. 1 Dill, SE NW Sec. 17-13-3w ..Shut down 6,821 ft.; P. B. to 6,-530 ft.; to shoot.
Warr et al's No. 1 Castle, SW NW Sec. 20-11-3w .....Shut down 6,440 ft.
J. F. Cuniff, trustee's No. 1 Church Land, NE SW SE Sec. 17-12-4w .....Shut down 6,700 ft.
Magnolia and Ramsey's No. 1 Johnson, C NE SW Sec. 35-13-3w .....T. D. 7,212 ft.; P. B. to 6,280 ft.; shut down.
Ryan Consolidated's No. 1 Lawton, NE NW Sec. 3-11-2w..Shut down 6,903 ft.; plugged back to 6,319 ft. to shoot.

PAWNEE COUNTY

Morgan & Flynn's No. 1 Freeman, NW cor. Sec. 1-20-5 ..Drlg. 1,420 ft.
Sperry et al's No. 1 Mullrap, SE SW Sec. 3-22-5 .....Rig.
L. E. Wentz' No. 1 G. Lilly, SE SW NE Sec. 26-22-3 ....Drlg. 2,195 ft.
Flynn & Morgan's No. 1 Jones, SW NE Sec. 22-20-5 ....Drlg. 3,334 ft.
Cochran et al's No. 1 Green, NE cor. SW Sec. 15-22-5 ....Rig.

PITTSBURG COUNTY

Apex et al's No. 1 Walker, NW SE Sec. 18-7-13 .....Shut down 1,400 ft.
C. Cannady's No. 1 Jones, NW cor. Sec. 14-8-14 .....Rig.

POTTAWATOMIE COUNTY

The Texas Company's No. 1 Knight, SW SE Sec. 3-8-3..Shut down 4,897 ft.

ROGER MILLS COUNTY

Bucy & Stone's No. 1 Williams, C SW Sec. 23-12-24w ..Shut down 2,245 ft.
L. C. Hivick's No. 1 Davis, C NW NE Sec. 4-11-26w ..Shut down 2,905 ft.

SEMINOLE COUNTY

Sunray Oil Co.'s No. 1 Sunday, NW SE Sec. 35-5-5 ....Location.

WASHITA COUNTY

Kauffman et al's No. 1 Nelson, NE cor. Sec. 1-8-14w ..Abandoned 1,275 ft.
Petroleum Holdings, Inc.'s No. 1 Musie, NW cor. Sec. 16-9-20w .....Shut down 280 ft.

WOODS COUNTY

Gypsy-Prairie et al's No. 1 Thompson, SE cor. SW Sec. 16-26-15w .....Shut down 6,104 ft.
Sinclair Oil & Gas Co.'s No. 1 Showwalter, C SW SW Sec. 33-27-16w .....Drlg. 7,256 ft.

WOODWARD COUNTY

Farrond et al's No. 1 Unknown, SE cor. SW SE Sec. 2-22-17w .....Shut down 1,387 ft.
Prairie Oil & Gas Co. et al's No. 1 Wilbur, NE cor. NW Sec. 22-23-17w .....Shut down 7,445 ft.
Burgoyne Brothers' No. 1 Merkins, SW cor. SE NE Sec. 16-21-19w .....Shut down 1,910 ft.

OKLAHOMA PANHANDLE

CIMARRON COUNTY

Magnolia's No. 1 School Land, C SW NE Sec. 27-5-5 ..Drlg. 4,297 ft.

TEXAS COUNTY

Argus Prod. Co.'s No. 1 fee, C SW Sec. 36-5-14 .....Drlg. 2,568 ft.
Argus Prod. Co.'s No. 1 Fischer, C NW Sec. 29-6-14 .....Location.
Argus Prod. Co.'s No. 1 Parker, C NW NW Sec. 18-6-15..T. D. 2,831 ft.; 2,500,000 ft. gas
Three Way Oil Co.'s No. 1 Crane, SW NW Sec. 11-1 18 .....Shut down 4,425 ft.
Palo Alto Oil Co.'s No. 1 Graves, NE SW SW Sec. 22-2-18e .....Spudded; shut down.

SOUTHERN OKLAHOMA

ATOKA COUNTY

Bryan-Croxton's No. 1 Mason, NW SE NW Sec. 4-1s-14 ..Shut down 1,550 ft.
Brookshire's No. 1 Guinn, NW cor. Sec. 18-3s-10 .....Shut down 100 ft.

BRYAN COUNTY

Bryan County Oil's No. 1 Childs, NW SE SW Sec. 7-7-10..Drlg. 340 ft.
Bush et al's No. 1 Commerce Trust, NE cor. Sec. 35-6s-9 .....Shut down 525 ft.
Johnson et al's No. 1 Ussery, SE SW SE Sec. 14-16s-7e ..Shut down 485 ft.
Marshall's No. 2 fee, C SW NW Sec. 26-5s-7 .....Shut down; 6-in. csg. 265 ft.

CARTER COUNTY

Campen-Lasater Co.'s No. 1 Anderson, NE cor. SE NE SE Sec. 32-4s-2 .....Shut down 2,590 ft.

CHOCTAW COUNTY

Choctaw Petroleum Co.'s No. 1 Wilson, SW cor. SW Sec. 15-6s-19e .....Shut down 1,345 ft.

COTTON COUNTY

H. J. Dillard's No. 1 McMillan, SE NW Sec. 2-4s-13w ..Shut down 2,705 ft.

LOVE COUNTY

Hobbs et al's No. 1 Roberts, NE cor. SW Sec. 20-6s-3w..Shut down 3,130 ft.
Gilcrease Oil's No. 1 Burkhart, NE NW Sec. 13-6s-1 ....Rig.

MARSHALL COUNTY

Pace et al's No. 1 Hicks, SW NW Sec. 8-6s-7 .....Drlg. 1,380 ft.
McCrory et al's No. 1 Adams, NE SW SE Sec. 31-7s-6 ..Rig.
Akers et al's No. 1 Spicer, SW SE SE Sec. 33-5s-7e ..Shut down 370 ft.

McCURTAIN COUNTY

Milton et al's No. 1 Vase, SW NW Sec. 26-6s-21 .....Shut down 2,287 ft.

STEPHENS COUNTY

Obermyer et al's No. 1 Skelton, NE SW SW Sec. 32-15-7w .....Rig.
R. Southard's No. 1 McKinney, NE cor. Sec. 25-1-8n ....Shut down 1,060 ft.

EASTERN FIELDS

(Continued from Page 130)

in his No. 37 on the Huntington Development Co. property. In Louden district the deep test of the United Fuel Gas Co. on the Black Bend C. & C. Co. tract is being cemented, the hole having caved around 4,540 feet.

In Sherman district, Boone County, the Pure Oil Co. has reached 682 feet in its No. 3 on the A. J. Horan and others farm, and is rigging up on the Grose and Cunningham farm in the same district. In Union district, Clay County, G. L. Cabot has reached 1,145 feet on the Blue Creek Coal Co. land.

In Lincoln, Wayne and Mingo Counties, the wells are mostly all shut down for water, which shortage is as bad as any time during the summer.

In Fayette County, Kanawha district, Grosscup & Schultz have reached 2,460 feet in their No. 4 on the Black Betsey Coal Co. tract and are rigging up for No. 5 on the same property and have locations ready for Nos. 6 and 7. The Montgomery Gas Co. has reached 2,156 feet and 1,976 feet in its Nos. 7 and 8 on the New River Colliery Co. farm in the same district, and has cleared a road for No. 9. In Falls district, G. L. Cabot is drilling his second test on the W. C. Newman farm and is down to 785 feet.

SOUTHWEST PENNSYLVANIA

There are three completions in Southwest Pennsylvania, which is fair considering the large percentage of wells shut down for lack of water. In Wayne County, J. T. Ingram & Co. completed their test on the Delia Maples farm to the Murphy sand at 962 feet, and it is showing for a fair gas well. In Washington County, M. F. Whitehill & Co. drilled No. 3 on the M. F. Whitehill farm to the Salt sand, 1,777 feet, and it is showing for a fair gasser. This farm is in Amwell Township.

In Beaver County, George Freshwater completed a test on the John Atens heirs farm in Hancock Township in the Berea sand and it is dry.

TENNESSEE FIELDS

(Continued from Page 130)

eral of the adjoining leases, working northwards to the production of Pratt and others near Mitchell Creek, on Obey River.

In Putnam County, Kirkwood & Campbell have suspended operations at 1,600 feet in No. 1 Jackson, 6 miles north of Cookeville where a commercial gas sand was reported recently.

In western Clay County, J. H. McClurkin is drilling at 675 feet in his No. 1 J. L. Woods farm, on Little Trace Creek, operations having been retarded by a bad fishing job; a good flow of gas was encountered at 315 feet but was later drowned by water in a sand at 380 feet. This well is near a location recently made by Armistead interests.

Ellis and Young, Owensboro operators, are reported going through the black shale at 220 feet in No. 1 Unseld farm, 4 miles down the Cumberland River from Ashland City in Cheatham County. This well started in the Fort Payne or New Providence series of limes, shales and cherty beds, which are very irregular, unconformable and baffling to the geologist, therefore affording an unlimited gamble as to structural conditions to the selfreliant prospector who prefers to be his own geologist and follows his "hunches."

Dickson County

Just across the Cumberland River in Dickson County and between the river and Jones Creek, No. 2 Oakley is drilling at 625 feet in a hard black lime showing some oil which T. J. Newell, the contractor, believes is a "cap rock"; the well has passed through several gas sands and had several showings of oil. About 1 mile north of this farm Wood & Kenyon are drilling their No. 1 Harris or Hunter at 500 feet; it is also in a hard lime with considerable showing of gas. It is reported that Evans & Garrison have taken over a block of leases near these wells and expect to move in a rig in the near future. Dickson County has long been the scene of oil and gas activities. Several deep wells were drilled there, some through the St. Peters to the Knox dolomite. A portion of the central part of the county was once mapped by a corps of geologists under Doctor Clapp of New York, but the structures they discovered were never thoroughly tested.

In Lincoln County, along the Alabama line, activity has slowed down due to Chattanooga Gas Co. interests getting three or four dry holes after the first four wells had resulted in phenomenally large gas production at very shallow depths. The later tests seemed to indicate a part of the large structure was barren and it is understood future drilling will be in a northeasterly course.

In Coffee and Franklin Counties, J. V. McGuire of Tullahoma is reported is winding up the details of a sale of a large block to an eastern gas concern involving the drilling of half a dozen deep tests. Mr. McGuire has shut down his well north of Manchester at 770 feet and will likely plug it; his latest well at Winchester is down 750 feet, with 300,000 feet of gas.

Kennedy & Son are very much elated over their unexpected success in rejuvenating the old shallow wells in the Tinsley Bottom Pool, a scene of great activity in 1924-25 when the DeFoe Brothers were busy bringing in 250 and 300-bbl. wells at around 500 feet. The Kennedy interests are reported to have increased the production from three wells to about 25 bbls. a day, and have spudded in a new well between the Nos. 2 and 7 Hamp Linn, in order to get a complete record of the formations and conditions of the subsurface. They are drilling it themselves in addition to doing all the other work on the lease.

The deep test at McMinnville is awaiting orders from New York. It is 2,700 feet and no showings were found below the St. Peters. The same is true of the deep test by same parties in the Keathly well southeast of Sparta, which is reported shut down at 2,650 feet. The local gas company at McMinnville is prospering and new orders for connections are being filed and additional wells are contemplated by the management to maintain an ample supply. Franchises for natural gas are to be granted in Carthage, Hartsville and Gallatin in the near future.

Developments in Vapor Phase Cracking

Process Becomes More and More Attractive as Operating Features Are Perfected and Quality of Products Are Appreciated

By C. R. Wagner
Pure Oil Co.

Much interest is shown today by the man on the street in the antiknock properties of the various gasolines being marketed. Fifteen years ago he was concerned with the odor and color and gravity of the gasoline dispensed by the same companies. Gone are his sensitive nose, his insistence on securing a 30 colored product and the fear of a 54-56 gravity motor fuel. Now he looks askance at a water white gasoline and demands something else than "straightrun gasoline," while he sniffs appreciatively over the aromatic odor of the highly cracked gasoline emerging as a red, blue or orange colored stream from the hose nozzle.

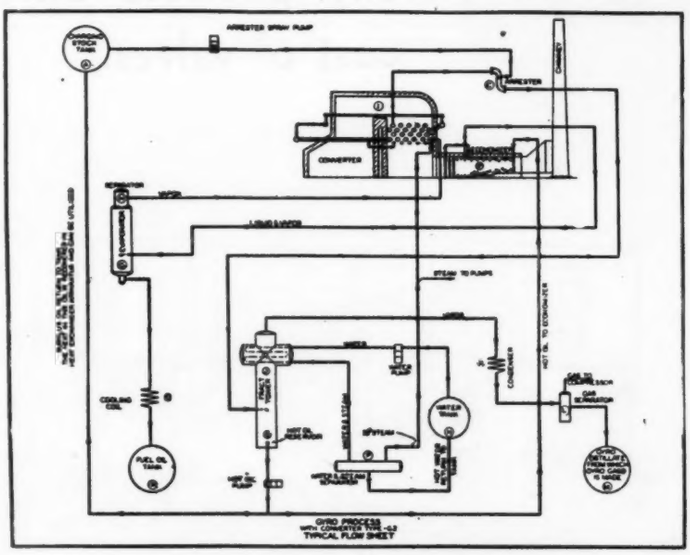
This radical change in attitude has been effected by the almost universal distribution of the high compression automobile engine. Because of their power, pick-up and high efficiency under widely varying conditions these engines have grown very popular, but they "knock" badly when using ordinary straightrun gasoline or the average unblended liquid phase cracked gasoline. This "knocking," or detonation, is very unpleasant to the driver, who may wish to demonstrate his car, because it seriously affects car performance as well as the ears of the passengers. To meet the demand for a satisfactory motor fuel for such engines, the refiner has available four methods of attack.

The most obvious method is to crack in his present liquid phase equipment such selected charging stocks as will yield a gasoline of high antiknock value. Due to the limited supply of such charging stocks very few can operate in this manner. The use of low endpoint gasoline recovered from natural gas, either alone or blended with low endpoint refinery gasoline, has been adopted by many. This gives a motor fuel with many valuable properties, although somewhat lacking in power, and a large number of motorists use such fuels exclusively. The practice is economically unsound, however, and will undoubtedly die out when crude oil begins to rise in price. A third method, and the one now most used by refiners, is to add to ordinary gasoline some antiknock agent, such as benzol, tetraethyl lead, or one of a host of similar products. The present general use of high compression engines is unquestionably the result of the wide distribution of these fuels. The fact remains, however, that the use of such "dopes" must always add materially to the cost of motor fuels, and that the refiner will collect an ever-decreasing margin over such a cost. It is not surprising therefore that much effort has been directed toward the perfecting of a fourth method of supplying the motorists' demand, a demand that insists furthermore on getting a pure hydrocarbon product. Such a product is produced by vapor phase cracking, although no commercially successful vapor phase cracking process had been developed until recently.

Art is Old

Vapor phase cracking is much older than liquid phase cracking, extensive experiments having been reported by Dalton in 1809, Faraday in 1825, and Silliman in 1855. In spite of the fact that liquid phase cracking was in commercial use for many years in producing kerosene, the first cracking process developed for the production of motor fuel was a vapor phase process developed by Cowper-Coles in 1906. For the next six years a great deal of development in cracking took place, practically all of it in the vapor phase field. The success of Doctor Burton in perfecting a commercial liquid phase process turned all development away from vapor phase cracking because of the economics of the situation. It is true that during the war Hall in England and Rittman in the United States were able to develop vapor phase processes, but the conclusion of the war and an increasing crude oil supply caused their abandonment.

There were several reasons for the failure of early vapor phase cracking processes,[1] even though a great deal of time and money was devoted to their development. The most important of these were deposition of coke, excessive gas production, high fuel consumption, and the production of a distillate which was very refractory to treatment by the then existing methods.



General flow chart showing typical operation.

Coke Formation

Coke formation in high temperature cracking processes is a very serious thing. If the deposit forms on the heating surfaces the metal walls of the tubes are quickly overheated and either burn out or rupture due to the pressure on the system. If the deposit occurs in the vapor lines the apparatus is very quickly out of commission. Some of the early inventors provided coke collecting chambers, or arranged their apparatus in parallel so that one vapor line exchanger could be cleaned while the other was in operation.

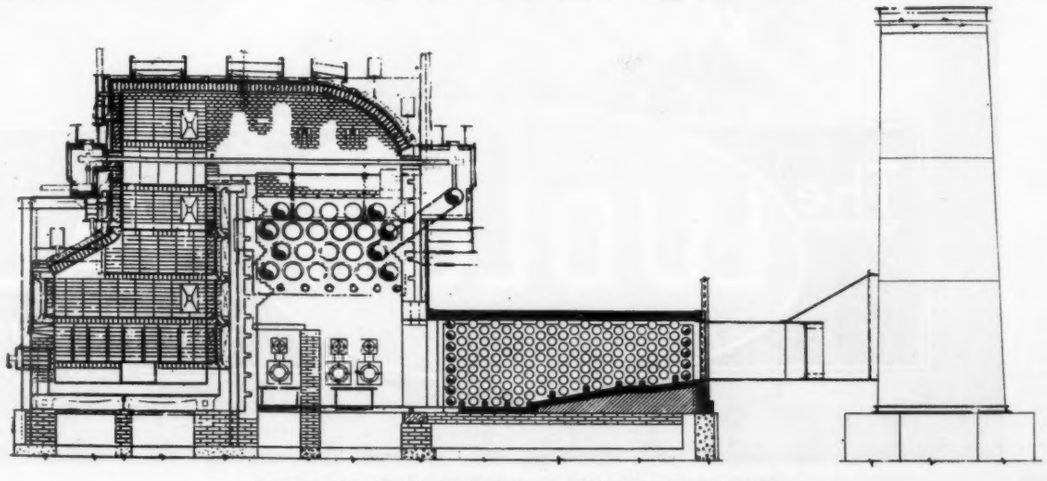
The formation of gas goes hand in hand with the production of coke, and in most of the early processes as much gas was produced as distillate, sometimes more. From the nature of things it is to be expected that vapor phase cracking will yield more gas than liquid phase, but it must be obvious also that to be successful a vapor phase process must yield as much distillate as the average phase process. A further objection to high gas production in some communities is the difficulty of disposing of the gas. Unlike fuel oil it cannot be shipped by tank car to customers hundreds of miles away.

It is apparent that more fuel will be required to heat oil to 1,050° to 1,100° F. than will be used in heating it to 850° to 900° F. In the early days it was not unusual, therefore, to have waste flue gases well over 1,000° F., a very costly heating job. Such a high fuel consumption naturally operated against the development of the process, since under the best of circumstances fuel costs represent from 20 to 30 per cent of the total operating cost.

Character of Distillate

The character of the distillate, however, was undoubtedly enough to prevent the growth of vapor phase cracking, had these other objections been overcome. Its color was a decided yellow that resisted all efforts toward removing it, while the odor of the distillate was very objectionable to noses accustomed to Pennsylvania straightrun gasoline. The use of sulphuric acid for removing color and odor was a well established custom among refiners of that day, but when they attempted thus to treat vapor phase distillate complications arose. A violent exothermic reaction set in resulting in tremendous losses by evaporation, polymerization and sulphonation. A loss of 30 per cent of the gasoline boiling point material in this manner was not unusual. After such treatment and rerunning a water white, aromatic smelling product was usually obtained which gave excellent performance in an automobile engine if used promptly. A bottle of this gasoline allowed to stand around for a few days in the light acquired a varnish-like odor, while the cork in the bottle became bleached and the gasoline left a sticky residue on evaporation. If tightly stoppered the bottle soon developed a partial vacuum due to the absorption of oxygen by the gasoline. Such oxidized gasoline when used in an automobile engine quickly caused trouble with the inlet valves and carburetor jets.

In spite of all of these troubles the product when freshly prepared gave such unusual performance in the way of acceleration, power, mileage, lack of detonation and freedom from carbon formation that gasoline consumers were very eager to secure the fuel regularly. The Gyro Process Co. was one of the early pioneers in this work and was one of the first to develop a commercially operable process for producing a marketable vapor phase cracked motor fuel. Experimental semicommercial plant operation was carried on for years before the first commercial installation began steady operation in 1927. Today it has nine installations comprising over 30 units in operation in the United States and abroad with others under construction. The total daily capacity of the units operating and under construction is 21,000 bbls. of gas oil. Due to the fact that in most cases topped crude is used as charging stock

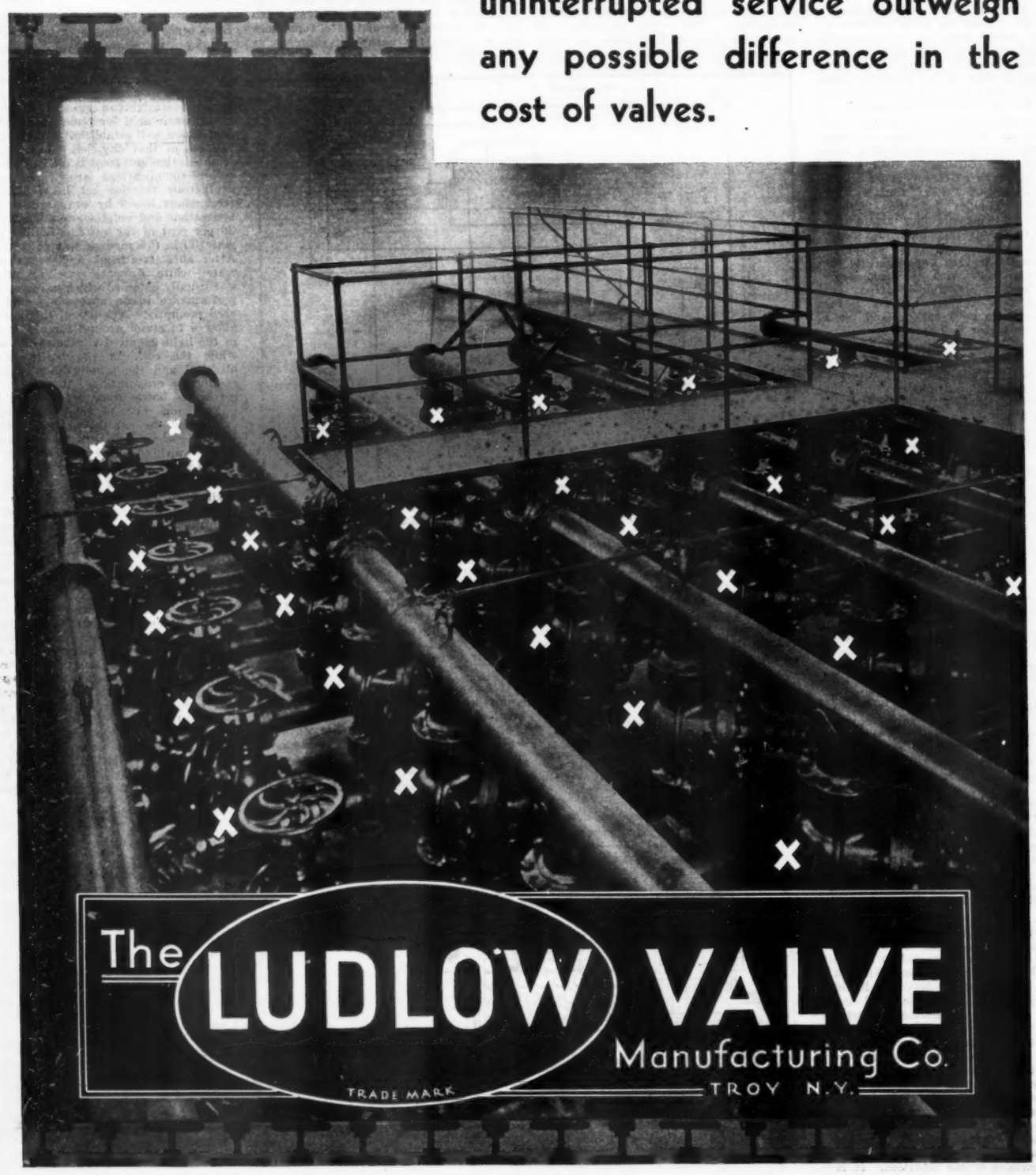


Descriptive drawing showing Gyro process with converter and economizer.

[1] An excellent resume of the literature may be found in Bulletin 114 of the United States Bureau of Mines and in an article by Lomax, Dustan and Thole, J. Inst. Pet. Tech. 3, 36-130 (1916). This paper was reprinted in J. Ind. & Eng. Chem. 9, 879-902 (1917).

X MARKS TRUE ECONOMY

X marks Ludlow Valves serving Prairie Oil at Carrollton, Mo. Thousands throughout the oil and natural gas industries are proving that low valve cost per year and uninterrupted service outweigh any possible difference in the cost of valves.



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the actual volume charged is considerably greater.

Method of Operation

In this process the fresh charging stock is delivered as a spray into the hot cracked vapors before they enter the fractionating tower. A reservoir in the base of the fractionating tower acts as a hot oil tank to accumulate the fractions not converted into gas and motor fuel. A portion of this hot oil is passed through an economizer to an evaporator, regulating the temperature so as to secure a fuel oil residue of the desired characteristics, while the excess hot oil is returned through heat exchangers to the fresh charging stock. The vapors from the evaporator pass through a series of drying tubes to remove traces of liquid and thence to the converter where they are cracked at a temperature of 1,050° to 1,100° F. Charging stock that enters the system must therefore leave as fuel oil, motor fuel distillate or fixed gas.

The entire process operates at very low pressures, only enough pressure being used to secure the desired flow of oil and vapor through the system, and the gases therefore contain a large quantity of motor fuel. This is recovered in the conventional manner. Owing to the very low pressure employed and the small quantity of oil under treatment at any time the hazard to life and property is very slight.

Careful investigation of the operation of the vapor phase cracking reaction has explained the failure of earlier workers to secure continuous operation. As in liquid phase cracking carbon and gas are the products largely of secondary reactions. By halting the reaction at a certain point carbon formation is precluded and operation may be carried on continuously. Practical evidence of this is found in operating records where units have remained on stream over 60 days and then were brought down for reasons other than the presence of carbon in the cracking zone or vapor lines. These units regularly run 30 to 40 days and are then shut down for inspection, since in this manner furnace repairs can be kept at a minimum. It can safely be said that carbon formation in the vapor phase cracking reaction has been eliminated.

The production of gas has been shown[2] to be at least partially the result of decomposition of motor fuel fractions at the high temperatures employed in the converter. In view of the fact that a very complex mixture of hydrocarbons comprises the vapors entering the converter it is unlikely that any set of conditions will ever be found which will produce the desired motor fuel without simultaneously producing considerable gas. Careful regulation of heat transfer and the handling of the simplest possible mixtures of hydrocarbons will minimize gas formation, however. It has been found that a variation of as little as 5° F. will cause an appreciable fluctuation in the ratio of gas to motor fuel. The importance of automatic flow controllers and temperature regulators in such an operation at once become apparent. It should be noted that, although the quantity of gas produced is still in excess of that found in liquid phase cracking, this excess gas is produced at the expense of fuel oil residues, since the yields of distillate are comparable.

Fuel economies have been effected by utilizing the flue gases leaving the converter to preheat the charging stock, while the heat in the cracked vapors has been used to generate steam and to rerun the distillate. By these means fuel consumption has been reduced to figures comparable with those for liquid phase cracking processes. Sufficient steam is generated to operate all of the pumps in connection with the process.

Refining Distillate

In the refining of the distillate have been encountered some very interesting problems. In the beginning the requirement was to secure a marketable product regardless of yield and it was found that about 80 per cent could easily be recovered as a water white product by treatment with fuller's earth. Application of new principles and the development of special equipment have made it possible to secure yields of 95 per cent or more of water white marketable fuel from end-point distillate. It is true that this fuel contains 50 per cent or more of unsaturated hydrocarbons, a very desirable condition from an antiknock standpoint, but undesirable from a gum-forming viewpoint.

Any motor fuel containing olefines will absorb oxygen from the air to form pseudo-gum[2] and the rate of absorption will depend upon the time of exposure, the concentration of oxygen in the atmosphere, the percentage and kind of olefines present, the temperature, the rate of diffusion of oxygen through the system and the extent to which actinic light or other catalyzing influences may be present. It has been found possible, however, to inhibit the oxidation of these compounds by a simple treatment, and it is now common practice to find such motor fuels giving perfectly satisfactory service even after months of storage. The problem of color removal without simultaneously destroying valuable motor fuel fractions and the more serious task of stabilizing the treated motor fuel have therefore been satisfactorily met. The by-products of the chemical research necessary to solve these questions, as is usually the case, have contributed notably to other phases of the industry.

Refining Sulphur Crudes

The recent discovery of enormous quantities of high sulphur crude oil in Venezuela and West Texas present a serious problem to the refiner. Aside from the severe corrosion caused by cracking such stocks in liquid phase equipment with the attendant danger of rupturing weakened high pressure vessels, a difficult task awaits the treater who attempts to remove the sulphur compounds from such cracked distillate. In order to get the sulphur content below 0.10 per cent a heavy acid treatment is necessary and this involves a correspondingly high polymerization loss. In vapor phase cracking, however, a much higher percentage of the sulphur appears in the fixed gas as hydrogen sulphide and a proportionately less quantity is found in the distillate. For example, a product containing 0.13 per cent sulphur was produced by cracking a Winkler gas oil containing 0.80 per cent sulphur, and a Mexican gas oil with 1.20 per cent sulphur gave a distillate with 0.23 per cent sulphur in it. These figures are but little more than half the quantity of sulphur to be found in liquid phase distillates from the same charging stocks. Treating methods have been developed for such distillates so that losses are little if any greater than in the handling of liquid phase distillates of the same sulphur content.

The motor fuel produced by the vapor phase cracking of Pennsylvania gas oil has an A.P.I. gravity of 54 to 55 degrees or about 8 degrees lower than the straightrun gasoline from the same crude. In cracking other charging stocks somewhat similar differences in gravity are observed, though the effect is much less noticeable in the case of charging stocks having a naphthene base. At the high temperatures employed a much closer approach to equilibrium is reached than is the case in liquid phase cracking, and as a result there is observed less difference in the characteristics of the products from different grades of charging stock. Differences are observable, however, and therefore some charging stocks are more desirable than others. Thus some stocks give a motor fuel having a blending value as low as 75 to 80 per cent of that of motor benzol while others give a product equal to or better than motor benzol. In no case have appreciable quantities of paraffin hydrocarbons been found in any of the distillates produced. It is believed that the compounds present consist mainly of olefines, cyclo-olefines, aromatics, partially hydrogenated naphthalenes, and cycloparaffins or naphthenes. It is possible that some dienes also may be present, although we have no direct evidence of this at present.

Properties of Fixed Gases

The fixed gas produced is very rich in olefines, in contrast with gases from liquid phase processes. The following analyses illustrate this difference, the two gases coming from the same refinery where they were produced from identical charging stocks.

	Cross process	Gyro process
Methane and hydrogen	46.3	35.4
Ethylene	1.2	22.9
Ethane	16.6	13.3
Propylene	5.5	15.1
Propane	16.2	0.0
Butanes and butadiene	4.3	5.5
Butanes	6.1	*1.4
.05 and heavier	3.7	3.4

*There is some question as to the accuracy of this butane determination and it is possible that these belong with the butanes.

The exact relation of isobutane, butane-1 and butadiene to each other is not known, though it seems fairly certain now that butane-2 is present in traces only, if at all. Complete analyses of gases from various charging stocks are being made but are not yet available. It is hoped to determine what effect upon the composition of the gas is caused by varying charging stock and cracking conditions. For industries interested in the use of this gas as a raw material for organic syntheses such information will naturally be very desirable.

Uses of Gas

At present large quantities of this gas are being used in the manufacture of ethyl alcohol, ethylene glycol, isopropyl alcohol, isobutyl alcohol and derivatives of these compounds. The possibilities for utilization of isobutane and 1, 3-butadiene also are dependent only upon finding a market for their derivatives. Already close to 200,000 cubic feet of each of these last mentioned compounds is being produced daily in such form as to be easily isolated. The cost of relatively pure unsaturated hydrocarbons from such gases is of course based upon motor fuel prices, but generally speaking they can be prepared at a cost per pound somewhat in excess of the cost of a similar weight of motor fuel.

A further use for this gas, and one that is finding a considerable application industrially, is in the enrichment of water gas. Possibilities in this field that are interesting include the shipment by tank car of liquid propylene and butylene to gas companies at a distance from refineries. Perhaps the most interesting development, however, is the conversion of these unsaturated compounds back into motor fuel. Research has been conducted over a period of several years along this line and semicommercial operations now justify the belief that about half of the fixed gas produced can be converted into a highly antiknock motor fuel of low enough volatility to be of value as an aviation fuel.

This product consists essentially of olefines and cycloparaffins with some aromatics and it has an antiknock value higher than the original vapor phase cracked distillate. In localities where the value of the gas is low because of a lack of demand for gas enrichment or chemical manufacture the process offers excellent possibilities for increasing the yield of motor fuel from charging stock. The installation costs involved are less per barrel of motor fuel produced than in the construction of the original cracking plant and the operating costs are relatively low. When combined with a variation in operation of the vapor phase cracking plant to permit production of a heavy fuel oil some very attractive yields are obtained. As an illustration of this yields by volume are given below as obtained by charging various materials derived from the refining of Mid-Continent crude oil.

Charging stock—	15 grav. pipe still bottoms	27 grav. topped crude	36-34 grav. gas oil
Motor fuel, finished, per cent	40.9	57.0	75.1
Fuel oil, per cent	45.3	30.9	11.4
Gas (1,350 B.t.u.), per cent	10.9	11.9	12.5

An active research and development program is being prosecuted in connection with all phases of the vapor phase cracking field and many interesting and valuable discoveries are indicated for the near future. As rapidly as may be consistent with the requirements for safeguarding such developments it is hoped to make them available to the public.

[2]Principles of Vapor Phase Cracking, by R. C. Osterstrom and C. R. Wagner, tenth annual meeting, A.P.I., Chicago, Ill., December 4, 1929.

[2]Factors Affecting the Determination of Gum in Gasoline, by C. R. Wagner and Julius Hyman, tenth annual meeting, A. P.I., Chicago, Ill., December 5, 1929.

ECONOMIC COMPARISON IN MEXICO OF LARGE AND SMALL DEVELOPMENTS

By Oliver B. Knight
Division Geologist, Huasteca Petroleum Co., Tampico, Mexico*

The producing formation in the South Field, or "Golden Lane" structure of Mexico, is a buried ridge of reef limestone of Comanchean age overlain unconformably with sediments of upper Cretaceous, Eocene and Oligocene. The structure extends in a long sweeping arc, with the convex side toward the west, from San Geronimo, Vera Cruz, to San Isidro, south of the Tuxpam River, which it crosses at the town of Alamo. It is 52 miles long and averages three-fourths mile in width.

The surface of the producing formation of El Abra limestone consists of a series of minor parallel highs which are separated longitudinally by synclinal troughs and laterally by structural saddles. The presence of these highs has been of utmost importance in the development of the field, especially in recent years when the salt water level has risen above the synclines and confined the oil to the isolated highs. In many cases, faulty information and interpretation of the subsurface has resulted in drilling costly dry holes and salt water wells.

Development

The development of the Golden Lane was started by the Mexican Eagle Oil Co. in 1906. No. 3 San Diego, usually known as Dos Bocas, the first producing well on the structure, was completed on July 4, 1908. This well came in unexpectedly for an estimated production of 129,000 bbls., and, as the casing was not properly set, the well flowed wild into the Tamiahua Lagoon, causing a loss of several million barrels of oil. In flowing wild the well formed a crater which covers an area of 48 acres, out of which salt water and small quantities of gas still flow. No. 2 Casiano, the Huasteca Petroleum Co., which yielded 200 bbls. of oil daily, and which was completed in November, 1909, was the next producing well to be drilled on the structure. In 1910, the same company completed No. 7 Casiano, with an initial production of 50,000 bbls. daily, and No. 1 Casiano, which produced 200 bbls. daily. In the same year, the Mexican Eagle Oil Co. completed its Potrero del Llano wells 1, 2 and 4, with initial productions of 500, 400 and 100,000 bbls., respectively. From 1910 to the latter part of 1919, development proceeded slowly because of revolutionary interference and lack of a market for the oil. During this period, the Huasteca Petroleum Co. completed its No. 4 Cerro Azul, with an initial production of 261,000 bbls. of oil daily. This well is unique in the history of the industry not only because of its tremendous initial production but also because it has produced nearly 80,000,000 bbls. of oil in a period of 13 years, and is still capable of flowing 4,000 bbls. daily. In total production, it has been surpassed only by No. 4 Potrero del Llano, which has produced over 95,000,000 bbls.

The demand for Mexican light crude oil in the latter part of 1919 caused a rapid development of the field, which

(Continued on Page 410)

*Fall meeting, petroleum division, A.I.M.E., Tulsa, October, 1930. Copyright, 1930, by the American Institute of Mining and Metallurgical Engineers, Inc.

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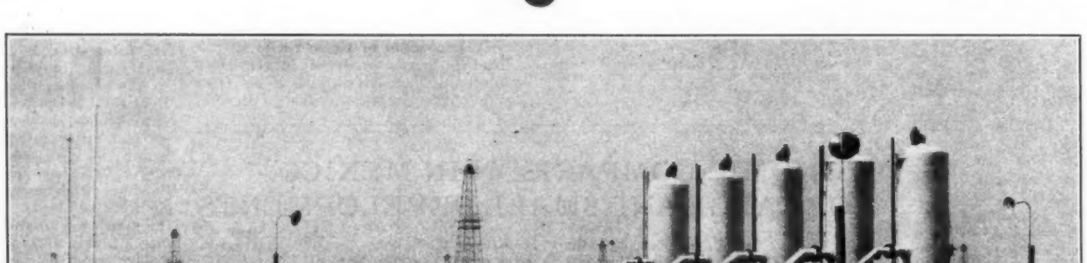

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Proper Lubrication of Gas Engines

Several Phases of Problem Due to the Different Type Engines and Varying Operating Conditions

By D. H. Foster
Lubrication Engineer, Mid-Continent Petroleum Corp.

Gas engines in so far as the lubrication is concerned can be divided into four general classes depending upon the construction and principle of operation. These are the horizotal two stroke cycle and four stroke cycle, and the vertical two stroke and four stroke cycle.

The principle of operation of the horizontal and vertical gas engines are identical, provided they are the same stroke cycle. The difference between the two and four stroke cycle engines is in the principle of operation.

Four Stroke Cycle

The four stroke cycle principle of operation may be briefly described as follows:

First, or charging stroke—Gas and air are drawn into the cylinder through the open inlet valve, by the piston moving away from the cylinder head, the exhaust valve being closed.

Second, or compression stroke—Both inlet and exhaust valves are closed, the piston moves toward the cylinder head compressing the mixed gas and air.

Third, or power stroke—Both inlet and exhaust valves are closed. The gas and air mixture is ignited causing an explosion which forces the piston away from the cylinder head.

Fourth, or exhaust stroke—The inlet valve is closed, the exhaust valve is open. The piston moving toward the cylinder head forces the burned gases out through the open exhaust valve.

This completes the cycle, there being three preparatory strokes and one power stroke, hence the expression "four stroke" cycle.

Two Stroke Cycle

The two stroke cycle principle of operation may be described as follows:

1. As the piston moves toward the cylinder head the exhaust and inlet ports to the cylinder are closed and the gas and air mixture is drawn into the compression chamber. This stroke may be called the inlet stroke. While this charge is being drawn into the compression chamber, another charge is being compressed in the cylinder between the piston and cylinder head.

2. When the piston reaches the end of the stroke the gas and air mixture in the cylinder is ignited causing an explosion which forces the piston away from the cylinder head. As the piston travels away from the cylinder head the gas and air mixture in the compression chamber is compressed. When the end of the stroke is reached the exhaust and inlet ports are opened. The burned gases escape through the exhaust port and the compressed gas and air mixture from the compression chamber enters the cylinder.

This completes the cycle there being one preparatory stroke and one power stroke.

Since there are three preparatory strokes to each power stroke in the four stroke cycle engine and one preparatory stroke to each power stroke in the two stroke cycle engine, the cylinder walls and piston of the two stroke cycle engine are exposed to hot gases longer than the cylinder walls and piston of the four stroke cycle engine. Consequently a lubricant used on the piston and cylinder walls of a two stroke cycle engine must be more heat resistant than the lubricant used on the cylinder walls and piston of a four stroke engine of the same size and operated at the same speed. Also the lubricant used on the cylinder of the two stroke cycle engine must necessarily distribute itself readily over the cylinder walls in order to insure proper lubrication. It is essential that the lubricant used on the cylinder and piston of the four stroke cycle engine be heat resistant and distribute itself readily over the cylinder walls but the cylinder walls are not so hot and there are three preparatory strokes to each power stroke permitting a better distribution of the oil film over the cylinder walls before it is subjected to the heat of the power stroke. Consequently an oil that gives satisfactory service on a four stroke cycle engine may not be satisfactory on a two stroke cycle engine.

Applying Oil

There are three methods in general use in applying oil to the cylinders and pistons of gas engines. These methods are: By the use of a mechanical device known as a force feed lubricator, by sight feed drop oilers, and by splash caused by the crank dipping in a reservoir of oil and throwing the oil.

The use of force feed lubrication should be preferred to any other method in lubricating the cylinders and piston. The lubricator should be designed on principles that will insure a constant uniform oil feed, independent of the height of the oil in the lubricator and independent of the viscosity of the oil. Each feed should be from a separate pump unit, independent of the other feeds and preferably have a sight feed arrangement showing the oil on its way to the engine. The feeds should be capable of being flushed and of instantaneous adjustment between wide limits.

Force Feed Lubricators

Force feed lubricators are usually driven by a cam or gear on some part of the engine with an operating lever which gives motion to the internal mechanism in the lubricator, so that the pump plungers automatically pump oil through the various oil pipes. The individual feeds of the lubricator once adjusted require no further attention. Check valves should be provided at the outlet ends of the oil pipes to insure that the pipes will always be full of oil. This will keep the pipes full even when the engine is not running and insures instant lubrication when the engine is started.

The lubricator should be adjusted to inject the oil on the piston preferably between the first and second rings when it is in the most outward or backward position. This enables the piston to carry the oil well into the cylinder and act as an oil distributor, cleaner and more economical lubrication of the piston is obtained and practically no oil is wasted. Injecting the oil at any other time or place will result in a larger oil consumption, more carbon deposit and a lower margin of safety. On small engines one feed line to the cylinder is sufficient, but on large engines more than one feed line is necessary to insure good distribution of the oil.

Drop Oiler

The sight feed drop oiler was in general use before the advent of the force feed lubricator, and there is still a large number of engines in service equipped with them. Gravity sight feed drop oilers will feed approximately twice as much when full as when the oil is low in the container. If the feed is adjusted when the oiler is full the engine will suffer for the want of lubrication, if adjusted when the oil is low or about empty an excess of oil will be fed to the cylinders and piston when the lubricator is full. The oil feed is very susceptible to temperature changes and the needle valves easily choke with dirt. Engine attendants often forget to start or stop the oiler when the engine is started or stopped. Which results in a scored cylinder or a waste of oil. The oilers often go for long periods without adjusting. It is necessary that they be equipped with a check valve to prevent the blow-back of escaping gases into the sight feed.

The installation of a force feed lubricator in the place of sight feed drop oilers often results in a reduction of as much as 50 per cent in the oil consumption.

Splash System

Some small horizontal and a large number of vertical gas engines depend partly or entirely upon splash from the crankcase for the lubrication of the cylinders and pistons. This method furnishes an excess of oil on the skirt of the piston and cylinder walls which is scraped off the walls by the piston and piston rings. This lubricates the piston and cylinder walls, but all the excess oil that comes in contact with the hot piston and cylinder walls drains back into the crankcase. This oil soon becomes contaminated with dirt and carbon resulting in a poor lubricant even if the original oil was the best obtainable. Therefore it soon becomes necessary to drain the crankcase and fill with new or clean oil which results in an excessive oil consumption.

The wrist pin on some of the smaller gas engines is lubricated by the excess oil on the top of the piston skirt being collected in a groove and dropping through a tube into the wrist pin bearing. When this method is used it is necessary to supply a surplus of oil to the piston in order to insure lubrication of the wrist pin and the oil draining from the piston is more or less contaminated with carbon. However, most engines are equipped with separate oilers for the wrist pin and piston which permits the correct amount of oil to be fed to each.

The external parts of the engine, which includes all bearings other than the piston and cylinder and valves, are on some engines lubricated by a multiple feed force feed lubricator. On others a gravity feed circulating system is used. In either of the above cases the excess oil drains from the bearings to a main reservoir, from which it is pumped to either the force feed lubricator or the gravity feed storage. The oil is usually passed through a filter after leaving the reservoir. Either of the above methods result in good lubrication with very little waste of oil.

On some engines employing crankcase splash lubrication the wrist pin, crank pin, main bearings, end crosshead guides are lubricated by the splash. On other engines the main bearings and lay shaft bearings are ring or chain oiled. Usually in this case the crank and wrist pins and crosshead guides are lubricated by sight feed oil cups or by the splash system. The other external bearings are usually hand oiled.

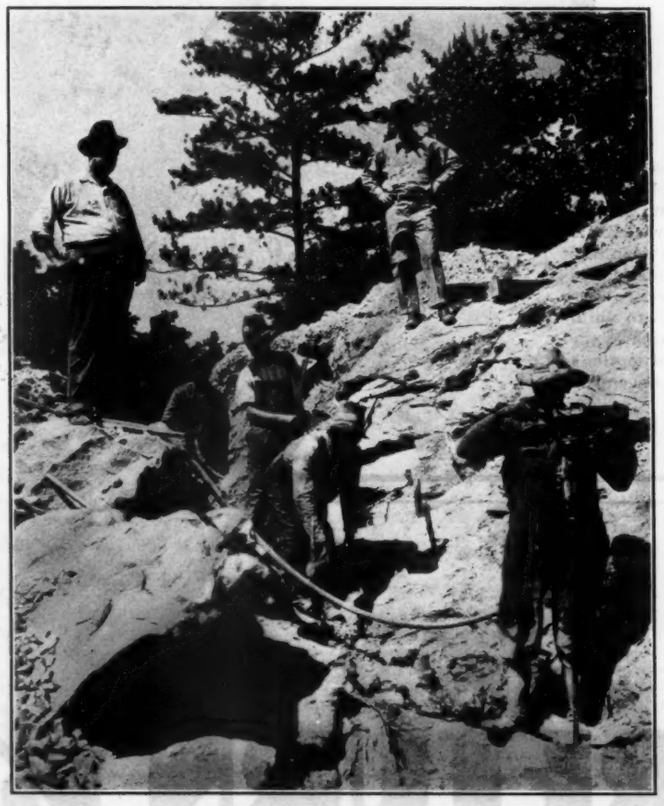
The valves require very little lubrication. On large engines they are usually oiled by the force feed lubricator. On small engines they are hand oiled or are equipped with sight feed oil cups. In any case they should not receive an excessive amount of oil as an excess of oil leads to the formation of carbon deposits.

Over Feeding

The lubrication of the external parts of the gas engine causes much less trouble than the lubrication of the piston and cylinder. Probably the cause of most of the troubles encountered in lubricating the piston and cylinder is the over feeding of oil. The surplus oil fed to the cylinder burns and chars. It collects the impurities from the gas and air. This results in a dark carbonaceous deposit of a harder or softer nature, depending

(Continued on Page 408)

PIPE LINE CONSTRUCTION DIFFICULTIES



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KEY RETURN BENDS

Recent Developments in Flow Control

Modern Refinery Practice Constantly Requiring New Type Instruments in Important Phases of Plant Operation

By J. B. McMahon
The Foxboro Co.

It is well known that during the middle of the nineteenth century Samuel Kier, a Pittsburgh druggist, started the first United States petroleum refinery. In those early days no guide to distillation operations was employed other than the judgment of the still operator. It was not long, however, before it was found that trusting entirely to human judgment resulted in too much variation in product. The introduction of instruments to refinery distillation was then but a matter of time.

Thermometers

During the following era of development, it was recognized that a relation existed between the pressure of the oil being distilled and the composition of the vapors being drawn off. Closely following on the heels of this came the realization that, with such a complex mixture of hydrocarbons as petroleum presents, pressure was not the most important factor—temperature was. As a result, mercurial type thermometers came into wide use. For a considerable time thereafter these were the only guides used by refiners.

With the continued use of batch still operation, the decision was made that temperature was important not only from a static but also from a dynamic point of view. The rate of temperature change was then accorded its true relation in still operations. As a result, recording thermometers were installed on batch stills to take account of the importance of this newly accepted time element.

The advent of continuous still operation, brought recording pressure gauges into general use. Recording thermometers, however, still kept their relative importance.

Flow Meters

Shortly after this development cycle had run its course, a third factor began to call for attention—this was flow. The widespread acceptance of the relative importance of flows led to the serious application of the flow meter in all its forms to the various refinery problems.

Automatic Control

Continuous operation, which was now universally accepted, involved transfers of fluids from one vessel to another. These transfers, frequently made under pressure, formed the basis for the later developments in automatic control. Hand control was rapidly assuming lesser importance.

The simultaneous development of bubble towers and continuous operation in both shell and pipe stills clinched definitely the absolute need for adequate automatic control. Recorders, while still necessary, were no longer sufficient. Automatic control with records was soon to assume leadership.

Controllers

The early controllers used in refineries had been previously developed for processes in other industries. Among the first to be adopted were the temperature controllers. Closely following, were the ordinary pressure regulators that had been used for years in reducing steam and natural gas pressures. These were developed further, and applied to reducing pressures and back pressures in refinery operation. The use of the pilot operated and relay type pressure controllers was the natural outgrowth of these early regulators. Their consequent rapid development was due to the ever-increasing demand for closer and finer pressure regulation.

As refining operations grew more complex and the interchanging of variables in the processes became more involved, temperature controllers had to develop rapidly from their simple, early stages. It was a case of either going forward or back—a static period in their development was impossible. In consequence, the throttling or floating action temperature controller was introduced. Following its introduction, it was soon realized that, in many cases, accurate temperature control was impossible of attainment in any other way. Today accurate, trouble free

Flow ratio controller in operation at Baltimore, Md., refinery of the Continental Oil Co.

temperature control is far from solved. On many refinery processes it is still being studied by both refiners and equipment manufacturers.

Flow Control

Until recently, the third variable in refinery operations was left to be controlled by hand. This third variable, flow, was not given its proper place of importance in the production scheme of refinery operation. It was generally assumed that variations in rate of flow did not appreciably affect operations, i.e., if they were not sudden or of great magnitude.

However, when proper consideration was given to the inter-relations existing between temperatures, pressures and velocities it was soon seen that it was fully as important to control flow as to control either of the other variables.

Recent Developments

The past year has seen the greatest realization of the importance of flow control in refinery operation. Refiners have been presenting new and greater demands for flow regulation, with the result that flow control has taken its greatest step forward during 1930.

Controlled Valves

The importance that a controlled valve plays in obtaining accurate control was first widely realized during the current year. The idea, was thoroughly dispelled, that a controlled valve was an extra—just another valve to be bought. It was openly acknowledged that every controlled valve must be considered from an engineering point of view if satisfactory and complete automatic control is to be obtained.

These facts, and others were made public by the Foxboro Co. during the current year, with its bulletin on V-Port Controlled Valves, which is an engineering treatise on control and controlled valve reactions. It embraces years of study by the Foxboro engineering staff in the field of automatic flow control.

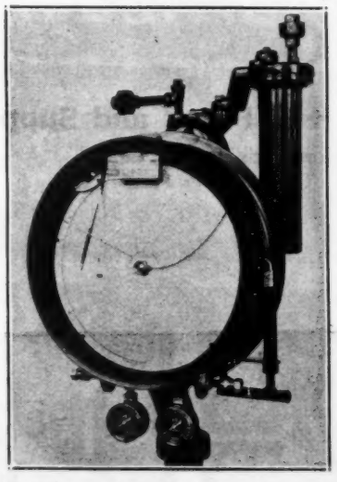
High-Pressure Controllers

The increasing use of high pressures in refineries has brought about a new set of problems for the obtaining of an adequate flow regulation. Up to within recently, flow controllers specifically designed to withstand the higher pressures were not on the market. This past year, however, has seen the marketing, by at least one manufacturer, of flow controllers that were primarily designed to withstand pressures up to 5,000 pounds per square inch. This manufacturer furnished the controllers in two designs for 0-2,500 pounds and 0-5,000 pounds per square inch capacities. Figure 1 shows the sturdy construction of one of these new high-pressure flow controllers. This particular instrument is designed for the automatic control of flows up to 5,000 pounds per square inch pressure.

All the working parts of these high-pressure flow controllers that are subjected to pressures are one-piece steel forgings. Every detail in their construction is designed specifically for high-pressure work. Only the 5,000-pound controller, because of its weight, requires loading devices during installation. Both these flow controllers are entirely automatic in their operation and are operated on compressed air at 15 pounds per square inch. In working principle and fundamental design they are similar to their earlier brothers, the air-operated flow controllers that have been used for many years by the oil and gas industry.

Flow Ratio Controller

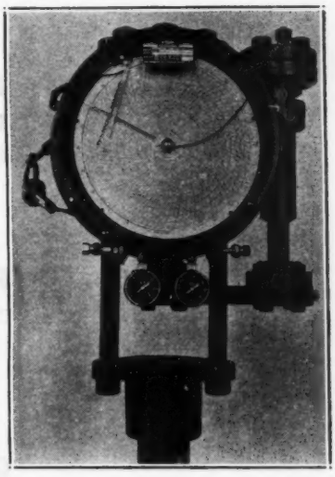
The installation of the first absorption tower created the problem of ratio flow



Differential controller for liquid levels.

control. This problem was first successfully met during the current year by the development of flow ratio controllers which are applicable to those processes where the controllable flow of one fluid should bear a definite ratio to the uncontrollable flow of another fluid.

The illustration shows a typical flow ratio controller, many of which have been installed on absorption towers in oil refineries. This is one of the latest installations and shows Foxboro flow ratio controllers at the Continental Oil Co.'s Baltimore refinery. A recent magazine article, commenting on this installation, said: "The oil rate is controlled by means of a ratio controller shown in the accompanying cut. By means of this control the gallons of oil per 1,000 cubic feet of gas to the absorber is maintained constant. This is highly important for economic operations in a refinery, due to the continual and often great variation of gas production from hour to hour. This



High pressure flow recorder controller for pressures above 2,500 pounds and up to 5,000 pounds.

variation in load required the absorption plant to possess a high degree of flexibility. In some distances the volume of gas treated by the plant changed from less than 1,000,000 feet to over 3,000,000 feet in a period of a few hours. The control mentioned above and other automatic controls permitted the plant to pick up this increased loading without more than the usual supervision by the operators."

This newly developed flow ratio controller is made by the Foxboro Co. of Foxboro, Mass., and is of the utmost simplicity in operation. It is essentially two instruments in one—a flow meter and a flow controller. These instruments are so connected that the rate of flow of one fluid as measured by the meter controls the rate of flow of the second fluid. The meter constantly readjusts the control point of the controller, thus keeping the two fluids in the desired proportions.

Differential Controller

This was not all, however, in the development of flow control for the current year. Differential controllers, commonly used for flow control in oil refineries, were applied to controlling the level of liquids under pressure. For instance, on a dephlegmator and an absorption tower the level can now be automatically controlled by a differential controller. The level is kept constant by maintaining the inlet rate. This is a highly desirable feature if temperature control in the stills to which the fluid flows is to be kept even.

A type of controller used for this service is shown above. It successfully accomplishes its task because of its built-in smoothness of operation. This controller gives full-floating valve action and is designed to operate the controlled valve from a completely closed to a completely open position with a variation in liquid

(Continued on Page 180)

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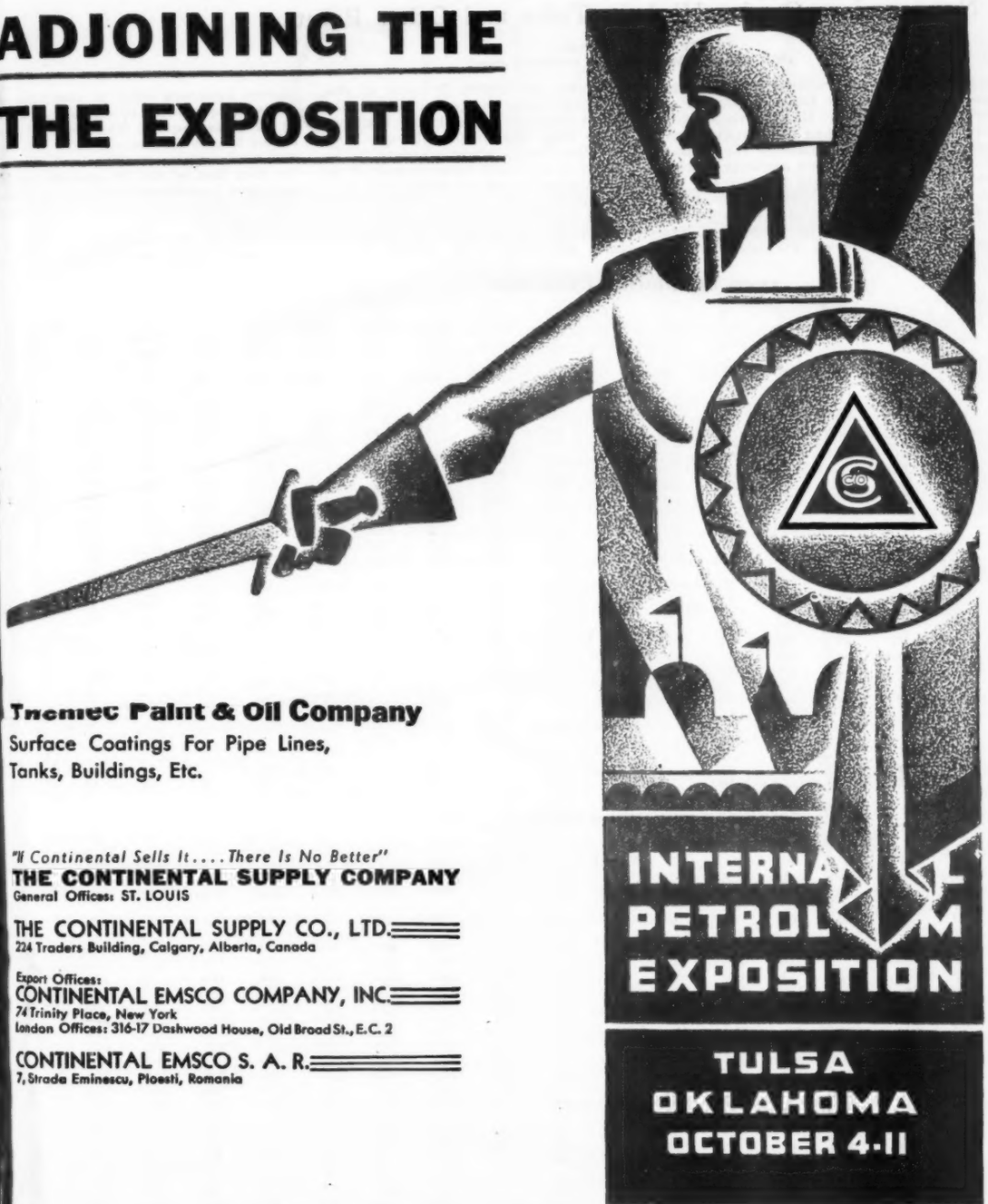

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ENTAL

Gasoline Antiknock Quality Improves

Representative Survey Shows Rating of Premium and Nonpremium Grades High in Tulsa and Other Points

By H. T. Bennett
Chief Chemist, Mid-Continent Petroleum Corp.

A survey of gasolines sold in various parts of the country shows that the motorist is assured of being able to purchase excellent gasolines of high antiknock value. Ethyl Gasolines and most other gasolines of high antiknock value are sold at 3 cents premium. The sale of Ethyl Gasoline by an increasing number of companies indicates the demand of the motorist for the highest quality antiknock gasoline. In Tulsa only 8 of the 23 companies selling premium motor fuels do not use Ethyl Gasoline.

Tests of Ethyl Gasoline show that all companies handling this antiknock gasoline can readily increase the antiknock value of same when necessary as chemical tests show that none of the Ethyl Gasolines contain the maximum of 3 c.c. of tetra ethyl lead per gallon, the quantity permitted by the Government. Every c.c. added, however, will increase the cost 0.35 cent per gallon. In spite of this, however, some companies are selling Ethyl Gasoline having higher antiknock value than that required by the Ethyl Gasoline Corp., whose standard is superior to antiknock value to most of the nonethylized gasolines being sold at a premium.

The survey of gasolines being sold shows that the motorist in addition to being able to purchase gasoline of the highest antiknock value is also assured of receiving gasoline of excellent quality in all other respects. The desire of the refiner to give the motorist more volatile and nondetonating gasoline is shown by the fact that of the 70 samples tested none had a maximum boiling point above 434° F. and 22 samples had a maximum below 400° F.

In spite of the increased volatility of the gasoline being sold this summer, the

TESTS OF PREMIUM GASOLINES

Company No., station, month collected—	1 Tulsa May	2 Tulsa July	2 Tulsa Aug.	3 Tulsa July	3 Tulsa Aug.	4 Tulsa May	4 Tulsa July	4 Tulsa Aug.	5 Tulsa July	5 Tulsa Aug.	6 Tulsa May	6 Tulsa July	6 Tulsa Aug.	7 Tulsa May	7 Tulsa July	7 Waterloo, Iowa Aug.
Gravity	58.9	60.9	61.2	57.0	57.3	55.2	58.6	58.9	58.3	59.8	60.5	58.9	58.5	62.3	60.7	60.1
I.B.P.	93	114	124	116	124	98	110	114	107	105	97	114	125	98	112	112
5	118	142	145	148	156	133	143	139	134	132	132	140	151	128	144	138
10	133	156	159	169	174	148	162	158	155	146	150	154	169	142	158	154
20	162	177	184	202	203	187	194	189	181	178	182	189	197	170	186	182
30	193	200	207	230	232	221	221	218	216	206	208	212	220	196	206	206
40	225	226	233	260	259	253	249	249	244	234	236	238	242	218	236	229
50	258	252	254	282	286	280	274	282	271	260	256	251	265	238	246	252
60	286	276	282	306	317	303	297	304	299	289	274	274	284	262	266	270
70	321	298	318	329	337	316	323	326	324	318	298	292	310	278	282	290
80	354	338	346	352	359	353	345	355	359	350	320	322	332	304	307	312
90	388	373	383	379	384	380	373	382	384	382	348	356	360	332	336	340
Max.	414	421	422	408	411	407	403	406	420	420	396	388	400	370	376	378
Per cent off at 212	37	36	32	24	24	28	27	28	29	32	31	30	27	36	33	32
Per cent off at 221	39	39	36	27	28	30	30	31	32	35	34	33	33	41	37	37
Per cent off at 284	60	64	61	51	50	52	55	51	56	59	64	65	60	74	72	67
Per cent off at 392	92	93	92	94	94	94	95	93	91	93	96	...	95.5	...	...	...
Recovery, per cent	96	97	96.5	97	97	96.5	97.5	96	97	97.5	97	97.5	96.5	96.5	97.5	97
Color	orange	red	red	red	red	red	red	red	red	red	red	red	red	25	25	17
Doctor	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	sour
Reid vapor pressure at 100° F.	...	7.0	6.9	5.5	5.9	...	6.9	7.3	7.3	7.8	...	7.0	6.0	...	6.2	7.6
Gum, mgs. per 100 cc. (copper dish method)	16	14	...	18	...	19	29	...	32	...	12	15	...	4	14	13
CC. tetraethyl lead per gallon to equal new Ethyl standard*	0.4	Ethyl	Ethyl	Ethyl	Ethyl 0.05 above	none	Ethyl	Ethyl 0.25 above	Ethyl	Ethyl	Ethyl	Ethyl	Ethyl	none	0.45	none
Contains cc. tetraethyl lead per gallon†	...	1.92	...	1.73	...	...	1.32	...	2.05	...	1.52	1.64	...	...	...	...
Aniline No.	38.5	52.7	...	47.9	...	42.6	48.3	...	51.0	...	51.0	50.2	...	41.8	42.8	42.9
Per cent absorbed in sulphuric acid	23	13	...	16	...	17	18	...	12	...	9	11	...	21	16	..

TESTS OF PREMIUM GASOLINES

Company No., station, month collected—	8 Tulsa May	8 Tulsa July	9 Tulsa May	9 Tulsa July	10 Tulsa May	10 Tulsa July	10 Waterloo Iowa Aug.	12 Tulsa May	12 Wilmington, Del. June	13 Tulsa May	14 Tulsa May	20 Wilmington, Del. May	21 Wilmington Del. May	22 Waterloo Iowa Aug.	22 Chicago Ill. Aug.	22 Madison Wis. Aug.	23 Tulsa July
Gravity	60.7	59.4	63.0	61.7	61.9	59.2	59.8	60.5	56.2	59.5	59.7	55.6	61.1	60.8	60.4	60.4	60.9
I.B.P.	98	114	107	110	97	116	112	104	114	96	100	104	104	116	120	115	92
5	120	140	...	140	125	138	136	...	140	122	126	136	130	146	144	144	126
10	142	156	147	154	140	156	150	141	162	140	144	156	144	164	158	160	144
20	170	187	167	176	165	186	176	168	194	176	174	196	172	190	188	185	177
30	198	208	187	196	189	210	204	199	222	212	206	226	200	214	210	206	209
40	226	227	206	214	216	232	228	226	246	248	232	254	224	232	230	228	234
50	246	244	225	230	239	252	254	255	276	280	257	278	246	250	248	246	258
60	262	260	240	246	257	275	278	284	300	314	287	300	270	267	266	264	282
70	284	278	257	264	277	298	302	312	326	342	312	322	294	284	284	280	304
80	298	300	280	284	305	324	332	344	350	372	340	348	318	304	310	310	329
90	344	352	315	316	347	360	368	373	384	405	372	378	354	340	346	344	363
Max.	406	410	374	366	395	406	402	404	427	434	408	418	388	380	395	394	400
Per cent off at 212	33	33	43	38	39	32	34	35	26	30	33	25	34	29	31	32	32
Per cent off at 221	38	38	48	44	43	35	37	38	30	32	36	27	38	35	35	36	35
Per cent off at 284	70	74	83	80	72	67	64	60	54	52	59	52	66	70	70	71	62
Per cent off at 392	96	95	...	...	...	95	95	...	92	86	94	93	...	...	96	...	96
Recovery, per cent	97	97	97	97	97	97	97	96.5	96	95	97	96.5	95	97	97	97	96.5
Color	25	25	orange	orange	green	green	green	red	blue	red	red	red	red	red	red	red	red
Doctor	sour	sour	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.
Reid vapor pressure at 100° F.	...	6.2	...	7.0	...	7.1	7.6	...	7.5	...	...	6.6	8.8	7.3	...	...	7.5
Gum, mgs. per 100 cc. (copper dish method)	2	7	13	12	10	9	20	55	52	35	15	19	13	13	6	...	10
CC. tetraethyl lead per gallon to equal new Ethyl standard*	0.7	0.25	0.5	0.5	0.9	0.9	0.6	0.8	none	1.4	0.9	Ethyl	Ethyl	Ethyl 1.2 cc. above std.	Ethyl 2.0 cc. above std.	Ethyl 3.0 cc. above std.	Ethyl
Contains cc. tetraethyl lead per gallon†	...	...	...	...	...	...	...	...	...	...	...	1.5	2.25	1.74	1.55	1.56	1.7
Analine No.	44.3	44.2	48.6	50.1	45.1	46.0	44.0	44.2	40.0	48.1	45.4	47.4	50.5	51.1	49.5	48.5	50.1
Per cent absorbed in sulphuric acid	17	18	14	14	16	18	...	18	19	14	16	10	14	13	14	16	15

*The Ethyl Gasoline Corp., "Series 30" knock testing apparatus was used in all tests. The conditions for rating the gasolines were as follows:

1. Engine speed, 600 r.p.m.
2. Spark advance, 15°.
3. Cooling liquid temperature 212° F.
4. Cooling liquid volume 2,150 cc.
5. Compression pressure 138 lbs./square inch.
6. Air-fuel ratio—The ratio which produces maximum detonation of the fuel being tested.
7. Valve clearance 0.002 inch cold.
8. Spark plug gap 0.025 inch.
9. Bouncing pin contact point gap 0.010 inch.
10. Type of oil—paraffin base, Saybolt viscosity 120-125 at 210° F.
11. Quantity of oil 800 cc.
12. Standard gasoline—Ethyl Gasoline standard furnished by Ethyl Gasoline Corp.

†Lead tetraethyl in gasoline was determined by the method of Graham Edgar and George Calingaert of the Ethyl Gasoline Corp., Yonkers, N. Y.
Reference—Analytical Edition Industrial and Engineering Chemistry, October 15, 1929.
Aniline point—Run according to the method described in the 1929 tentative A.S.T.M. standards, designation D 91-29 T. page 407.

(Continued on Next Page)

USE THIS CHART

IT WILL HELP YOU TO SELECT THE CORRECT BEARING METAL FOR EACH OPERATION OF THE OIL INDUSTRY

	Equipment	Bearing Metal to Use
DRILLING a. Standard or Cable Tools	Steam Engines	Eagle Dreadnaught
	Sand Reels—High Speed	Eagle Dreadnaught
	Sand Reels—Old Style	Eagle Outlasta
	Jack Posts	Eagle Outlasta
	Calf Wheels	Eagle Durable No. 4
	Bull Wheels—New Style	Eagle Outlasta
	Bull Wheels—Old Style	Eagle Durable
	Crown Blocks	Eagle Outlasta
	Electric Motors	Eagle Dreadnaught
	Countershafts	Eagle Outlasta
	Clutches	Eagle Dreadnaught
DRILLING b. Rotary Tools	Steam Engines (Single or Twins)	Eagle Dreadnaught
	Electric Motors	Eagle Dreadnaught
	Pumps Rotary	Eagle Dreadnaught
	Draw Works	Eagle Outlasta
	Rotary Rigs	Eagle Outlasta
	Crown Blocks	Eagle Outlasta
	Traveling Blocks	Eagle Outlasta
	Clutches	Eagle Dreadnaught
	Rotary Drive Shafts	Eagle Outlasta
	Gas and Oil Engines, smaller than 35 H. P.	Eagle Outlasta
PRODUCTION	Gas Engines—35 H.P. and larger	Eagle Dreadnaught
	Oil Engines	Eagle Dreadnaught
	Electric Motors	Eagle Dreadnaught
	Clutches	Eagle Dreadnaught
	Countershafts	Eagle Outlasta
	Jack Posts	Eagle Outlasta
	Crown Blocks	Eagle Outlasta
	Traveling Blocks	Eagle Outlasta
	Bull Wheels	Eagle Outlasta
	Band Wheel Powers	Eagle Durable No. 4
	Compressors	Eagle Dreadnaught
	Electrical Pumping Units	Eagle Dreadnaught
PIPE LINES	Diesel Engines	Eagle Dreadnaught
	Pumps	Eagle Dreadnaught
REFINERIES	Diesel Engines	Eagle Dreadnaught
	Pumps	Eagle Dreadnaught

The accompanying chart has been developed by our research engineers as a further service to the men responsible for the smooth running of every branch of the oil industry.

A few years ago these same engineers perfected three bearing metals designed scientifically to meet 95% of all bearing metal requirements in the industry. The steady increase in the number of users who have standardized on these three Eagle Bearing Metals—and who have taken advantage of our free bearing metal counsel—has been proof enough of the need and value of this scientific solution of an important problem.

Use this chart carefully. You will find it extremely useful and good insurance. Ask us for any further information you desire on your specific bearing metal problems.

The Eagle-Picher Lead Company, Chicago, Joplin, Cincinnati.

EAGLE BEARING SERVICE

1

Eagle Dreadnaught High Speed Bearing Metal—
for extreme speed and heavy pressure conditions.

2

Eagle Outlasta General Service Bearing Metal—
for average speed and pressure conditions.

3

Eagle Durable No. 4 Bearing Metal—
for the less severe bearing requirements.

3 METALS SCIENTIFICALLY DESIGNED TO MEET 95% OF ALL BEARING METAL REQUIREMENTS

motorist should have little difficulty due to excessive volatility for summer driving as the Reid vapor pressure tests at 100° F. indicate that the "wild" or low boiling constituents have either been eliminated by the refiner or lost during the handling of the gasoline from refinery tank to tank car, to bulk station, to filling station tank, to pump and finally to customers car.

Of the gasolines tested only two had a vapor pressure above 8 pounds while many had a vapor pressure below 7 pounds. The survey shows that many summer gasolines are more volatile than winter gasolines sold a few years ago.

In spite of the high antiknock quality of the gasoline sold, the motorist with few exceptions should have no difficulty caused by the presence of excessive gum, as the survey shows that practically all samples contained less than 30 milligrams of gum per 100 c.c. by the copper dish method. This quantity is not considered excessive by most authorities, and some are of the opinion that even the gasoline containing the greatest quantity of preformed and potential gum, i.e., 55 mgs. per 100 c.c. would not cause trouble under normal conditions.

The tendency of the refiner to give the motorist nonpremium gasoline with some antiknock value is also shown in the survey. Many of the gasolines required less than 2.0 c.c. of tetra ethyl lead per gallon to equal the new Ethyl standard although the majority of Oklahoma crudes from which most of the gasoline samples were refined, produces gasolines that require 3 to 6 c.c. of tetra ethyl lead to equal Ethyl Gasoline standard.

The survey shows beyond a question of doubt that competitive conditions are such that the motorist is assured of receiving a product superior to that required by state and United States Government specifications and one that will give excellent results in any make of car.

FEATURES OF SURVEY

	Non-premium	Premium
Number of companies represented in survey*	22	17
Number of samples tested	37	33
Number of samples having gravity of 60 A.P.I. or higher	17	16
Number of samples having gravity below 58.0	4	5
Lowest gravity	53.6	55.2
Temperature at which 10% distilled	137–174° F.	133–174° F.
Number of samples having 10% below 158° F.	23	25
Per cent off at 212° F.	22–45	24–43
Per cent off at 221° F.	25–49	27–48
Per cent off at 392° F.	89–96	†86–96
Maximum	382–430	370–434
Per cent recovery	95.5–98	95–97
Reid vapor pressure at 100° F.	6.0–8.4	5.5–8.8 lbs.
Gum, mgs./100 c.c. (copper dish method)	5–17	4–55

*Companies: Cities Service, Gulf, Sinclair, Shell, Texas, Barnsdall, Magnolia, Continental, Phillips, Skelly, Sun, Pure Oil, Pierce, Wilcox, Transcontinental, Producers & Refiners, Tidal, Mid-Continent Petroleum Corp., Standard Oil of Indiana, Standard Oil of New Jersey, Atlantic Refining Co., Independent, and Deep Rock. †All except one sample above 91 per cent.

RECENT DEVELOPMENTS IN FLOW CONTROL PROBLEM

(Continued from Page 175)

level corresponding to a very small percentage of the instrument's range.

Ratio Controller

On some processes in the oil refinery, to maintain a proper balance, even closer attention to the flow of excess oil is necessary than is possible with the preceding type. This problem is solved by the development of a special type of ratio controller. In this set-up the primary instrument is a liquid level controller and the secondary instrument is a flow controller, controlling uniform outlet rate of flow. In this combination the liquid level controller sets the control point of the flow controller and a special construction permits it to reset the flow controller only at certain maximum and minimum levels. The liquid level may in this way vary between these limits without causing any change in the outlet rate of flow. If the storage capacity of the container is sufficiently large in comparison to the fluctuation in the inlet rate, the instrument will control the outlet rate of flow entirely independent of variations in the inlet rate. It is seen that in continuous operation this is an exceedingly desirable feature, for it means that the conditions present in refinery processes will not be upset by recurring changes in the flows of fluids coming to them.

Future Development

We have seen that during the past year control instruments for refineries have endeavored to meet closer regulation demands, and also that a definite trend has been established toward fitting the control instrument for a particular purpose. More particularly, we have realized that the importance of controlled valve reactions are becoming more widely recognized. As to the future, it appears probable that the further development of controlled valves will be the next great step forward. As previously mentioned in this article, at least one instrument manufacturer has openly shown that he has taken steps in this direction. Others may have or soon will follow. It does not seem too much to expect the next great advance in automatic flow control to come from this direction.

TESTS OF NONPREMIUM GASOLINES

Company No., station, month collected—	1 Tulsa May	2 Tulsa May	2 Tulsa June	2 Tulsa July	3 Tulsa May	3 Tulsa July	4 Tulsa May	4 Tulsa July	5 Tulsa May	5 Tulsa July	6 Tulsa May	6 Tulsa June	6 Tulsa July	7 Tulsa May	7 Tulsa July	7 Waterloo Iowa Aug.	8 Tulsa May	8 Tulsa July	9 Tulsa May
Gravity	60.0	64.2	62.4	63.3	58.7	57.7	58.9	59.8	58.4	57.3	60.0	59.9	59.5	61.8	60.8	58.4	59.3	58.4	60.2
I.B.P.	104	107	106	116	110	117	109	114	102	107	98	108	112	105	112	110	98	114	103
5	138	128	130	136	146	146	146	138	130	133	136	132	139	137	146	138	132	146	...
10	156	137	144	146	165	163	165	162	152	154	155	152	159	153	164	162	152	164	146
20	186	158	166	164	198	201	197	191	184	183	188	184	190	183	196	196	192	196	180
30	214	178	192	182	226	230	225	222	216	224	215	212	217	209	217	230	221	224	212
40	264	201	216	204	250	254	250	241	242	244	238	236	240	231	238	252	256	246	239
50	272	226	240	223	274	282	275	267	266	272	260	258	262	254	258	277	284	268	262
60	284	257	266	248	304	305	297	293	290	296	284	280	281	275	278	296	304	288	284
70	302	289	294	275	328	329	325	311	318	321	304	300	299	296	302	318	326	318	306
80	332	325	332	317	352	358	356	342	344	350	325	324	325	323	323	340	348	352	324
90	360	359	370	367	382	386	385	371	378	383	352	354	357	356	358	368	376	392	357
Max.	382	415	418	423	420	418	419	412	429	418	402	397	397	395	398	399	408	428	400
Per cent off at 212	29	45	39	44	25	24	26	27	28	26	28	30	28	31	28	24	26	26	30
Per cent off at 221	34	49	42	48	28	27	29	29	33	29	32	34	32	36	32	27	30	29	34
Per cent off at 284	60	69	67	72	54	51	54	56	57	55	60	62	61	66	63	54	50	58	60
Per cent off at 392	96	94	95	...	93	92	92	95	93	93	96	...	...	...	96	95	94	90	...
Recovery, per cent	97	98	97.5	97.5	98	97	97	97.5	97	97	97.5	97.5	96.5	96.5	97	96	97	97	97
Color	27	+30	27	+30	+30	21	26	28	+30	25	22	25	21	30	26	27	27	25	21
Doctor	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.	sour	sour	sour	o.k.	o.k.	o.k.
Reid vapor pressure at 100° F.	...	...	7.7	7.0	...	6.0	...	6.7	...	7.5	...	8.1	8.0	...	6.0	*7.5	...	6.2	...
Gum, mgs. per 100 cc. (copper dish method)	...	...	...	12	...	...	...	12	...	16	...	...	10	...	5	15	...	10	...
CC. tetraethyl lead per gallon to equal new Ethyl standard	...	...	2.6	1.9	...	3.95	...	6.0	...	1.6	...	1.3	2.2	...	1.65	2.1	...	3.0	...
Aniline No.	...	...	53.8	52.6	...	55.8	...	57.4	...	50.5	...	49.9	50.3	...	56.8	52.6	...	53.0	...
Per cent absorbed in sulphuric acid	...	...	...	13	...	...	...	6	...	9	...	...	9	...	8	...	...	10	...

*Pounds.

TESTS OF NONPREMIUM GASOLINES

Company No., station, month collected—	9 Tulsa July	10 Tulsa May	10 Tulsa July	10 Waterloo Iowa Aug.	11 Tulsa May	11 Wilmington, Del. June	11 Tulsa July	12 Tulsa May	13 Tulsa May	14 Tulsa May	15 Tulsa May	16 Tulsa May	17 Tulsa May	18 Tulsa May	19 Tulsa May	21 Wilmington, Del. June	22 Waterloo, Iowa Aug.	23 Tulsa July
Gravity	60.3	60.1	59.8	59.1	61.7	53.6	61.1	59.7	60.3	58.1	61.2	59.4	61.6	60.7	60.3	59.1	57.9	60.5
I.B.P.	108	98	110	116	96	110	114	107	100	115	102	108	104	100	100	100	116	93
5	136	128	136	144	134	142	150	...	137	146	136	137	128	127	126	134	152	136
10	150	146	156	162	154	160	170	152	144	165	163	155	144	142	146	148	174	158
20	178	182	186	192	187	200	194	187	175	197	186	192	172	176	178	182	206	190
30	207	212	214	220	212	232	219	221	207	226	212	225	204	207	210	215	234	220
40	232	236	242	244	229	258	236	255	237	250	234	254	230	238	238	242	258	239
50	254	260	...	266	248	282	256	279	263	274	254	278	256	266	266	266	280	256
60	284	294	284	288	268	314	274	304	291	300	275	296	280	292	292	292	302	276
70	305	316	312	312	290	316	294	317	315	329	296	320	300	316	318	314	326	300
80	330	346	348	332	321	362	326	347	358	355	326	350	332	346	344	334	350	321
90	352	384	382	376	354	394	356	372	398	384	366	368	364	376	378	366	376	357
Max.	395	430	424	418	391	425	396	408	428	420	428	406	405	398	424	400	416	400
Per cent off at 212	33	30	29	27	30	23	27	27	33	25	30	26	33	32	31	29	22	27
Per cent off at 221	36	34	34	31	36	26	32	30	35	29	34	29	37	35	34	32	25	31
Per cent off at 284	60	57	60	58	67	51	65	52	58	54	66	54	62	57	57	56	51	65
Per cent off at 392	96	92	92	94	...	89	...	...	89	92	93	95	95	94	93	94	93	96
Recovery, per cent	96.5	97	96.5	97	96.5	95.5	97	96.5	96	97	96	97	97	95.5	97	95.5	97	96.5
Color	19	27	25	25	blue	blue	blue	28	...	...	...	...	green	20	27	18	28	28
Doctor	o.k.	o.k.	o.k.	o.k.	o.k.	sour	o.k.	o.k.	...	...	...	...	o.k.	o.k.	o.k.	o.k.	o.k.	o.k.
Reid vapor pressure at 100° F.	6.0	...	6.2	6.3	...	7.9	6.2	...	...	...	...	...	...	...	...	8.4	7.3	7.3
Gum, mgs. per 100 cc. (copper dish method)	12	...	6	6	...	17	5	...	...	...	...	...	...	...	...	8	7	5
CC. tetraethyl lead per gallon to new Ethyl standard	2.1	...	3.0	3.3	...	none	3.9	...	...	...	...	...	...	...	...	1.35	3.0	3.0
Aniline No.	51.1	...	54.1	54.5	...	42.1	59.6	...	...	...	...	...	...	...	...	50.3	56.0	53.8
Per cent absorbed in sulphuric acid	10	...	10	...	...	11	4	...	...	...	...	...	...	...	...	10	...	6

Make Good Progress in Building Lines

Ajax and Union Gulf Systems From Oklahoma Will Add 100,000 Bbls. Daily Capacity to Outlet From That State

Pipe line capacity from Oklahoma to eastern points will be increased by 100,000 bbls. daily around the end of this year with the completion of two major oil trunk pipe lines on which construction work is being rushed. It is somewhat of a coincidence these two lines—the Ajax Pipe Line Co.'s twin 10-inch system, and the combination 10 and 12-inch line of the Union Gulf Pipe Line Co.—almost parallel from Jenks, Okla., to points near St. Louis, Mo.

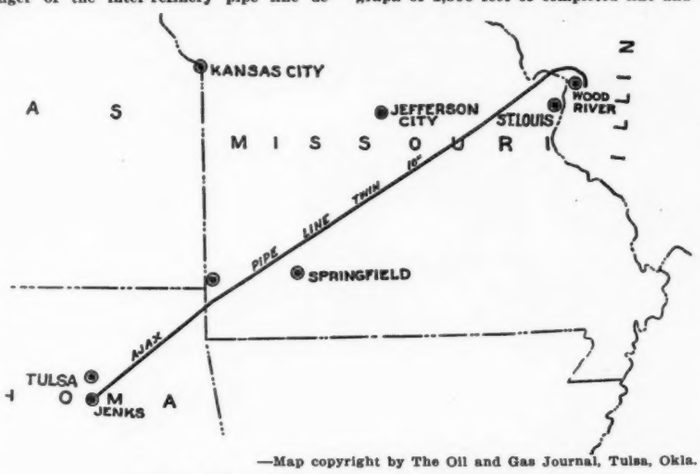
The Union Gulf line will have a capacity of approximately 35,000 bbls. daily. It extends northeast from Jenks, Okla., to Dublin, Ind., near the Ohio line and then branches down to Cincinnati, Ohio. From Dublin it also branches northeast to a point near Lima, Ohio, where it will connect with the Buckeye Pipe Line Co.'s system extending across northern Ohio and down to Pittsburgh, Pa. This line will obtain its crude oil supply from the Gulf Pipe Line Co. of Oklahoma, another subsidiary of the Gulf interests of Pittsburgh.

The Ajax line will be one of the largest initial capacity oil lines ever constructed. It will extend from the Glenn Pool in Oklahoma to Wood River, Ill., in the vicinity of Alton, just north of St. Louis, a distance of 400 miles. In addition to its capacity of 65,000 bbls. daily, this project is unique in the fact that it employs two 10-inch lines instead of a single line of larger diameter. There will be nine pumping stations, approximately 39 miles apart, each with three 500 horsepower Diesel engines directly connected with pumps having an individual capacity of 32,500 bbls. a day, so that two of the three units could keep the twin lines supplied to their maximum capacity, if necessary. Acetylene welding is being used throughout the entire trunk line and station work.

To carry out the construction of the new line, the Ajax Pipe Line Co. has organized as a subsidiary of the Standard Oil Co. (New Jersey). Heading this new unit is H. S. Austin, president of the Tuscarora Oil Co., Ltd., and manager of the inter-refinery pipe line department. Mr. Austin, who received his degree in civil engineering from Cornell in 1907, first came with the company as a draftsman for the National Transit Co. in Oil City, Pa., some four years later. For the next few years he went from one pipe line subsidiary to another until 1915, when he was transferred to the Oklahoma Pipe Line Co. In 1921 he came to New York as head of the inter-refinery pipe line department, and four years later was made president of the Tuscarora Oil Co.

Fast time is being made on the Ajax line. Not a length of pipe was laid prior to June 9, or any agreements made for field operations. Yet by June 27 an inspection party was able to snap a photograph of 1,500 feet of completed line and back-filled ditch, and by August 1 a total of 52 miles of pipe had been lowered into place. In addition, the building foundations of all nine pumping stations were well under way and all main engine foundations poured.

Considerable part of the right of way lies through rough and broken country, with a number of hills through which it is necessary to blast. Some of these elevations are so steep that the field crew found it necessary to weld sections of line on top and then ease them down the slopes with the aid of tractors.



—Map copyright by The Oil and Gas Journal, Tulsa, Okla.

Map of twin 10-inch pipe line of Ajax Pipe Line Co.

Five river crossings constitute another big job, although the beds of many streams throughout the entire territory were burned dry by the merciless heat. Work on these, as well as bottom land crossings, is being hastened to completion before the arrival of heavy weather in the fall.

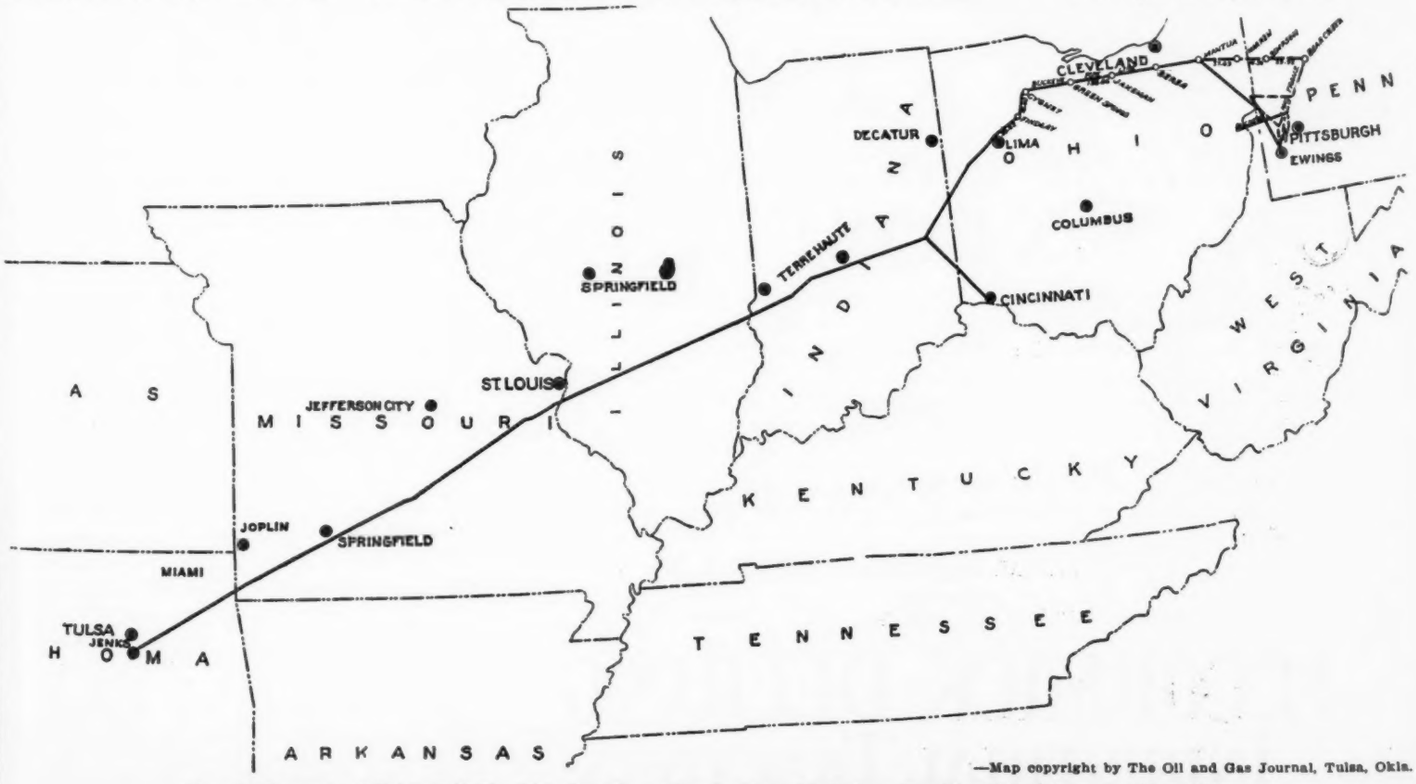
Another feature of the project is that both lines are being coated for their entire length with two applications of paint, and then wrapped in saturated felt. The first coat, or primer, is cold and is applied with slings and brushes. Then comes a one-eighth-inch hot coating, heated to 300°. A hand operated pipe wrapping machine whirls on the spiral wrap of saturated felt to top off the job.

At the present rate of speed, the line figures to reach its destination sometime around the end of the year.

The Illinois Pipe Line Co.'s system extends east from Wood River, Ill., and provides a logical connection for the Ajax pipe line at Wood River. The Illinois pipe line also connects with the Buckeye Pipe Line Co.'s system and the latter with other subsidiaries which extend to the Atlantic Seaboard. Hence, through these connections, crude carried by the Ajax from Oklahoma can be transported directly to refineries along the East Coast.

The Gulf Oil Corp. is extending its refining capacity at Cincinnati, Toledo and Pittsburgh. It is making rapid progress on the construction of the pipe line of its subsidiary, the Union Gulf Pipe Line Co., the Oklahoma end of the line being practically completed.

There has been considerable speculation among oil men in the Mid-Continent area as to the effect the Ajax and Union Gulf lines will have on the general situation in that area. Also as to the effect upon existing oil carriers.



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Map showing route of Union Gulf Pipe Line Co.'s line, and connection with Buckeye Pipe Line Co.'s system near Lima, Ohio.

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This McCormick-Deering is taking a 16" gas line through tough going for Truman-Smith Construction Co. Outfit photographed on Cities Service line near Independence, Kans.

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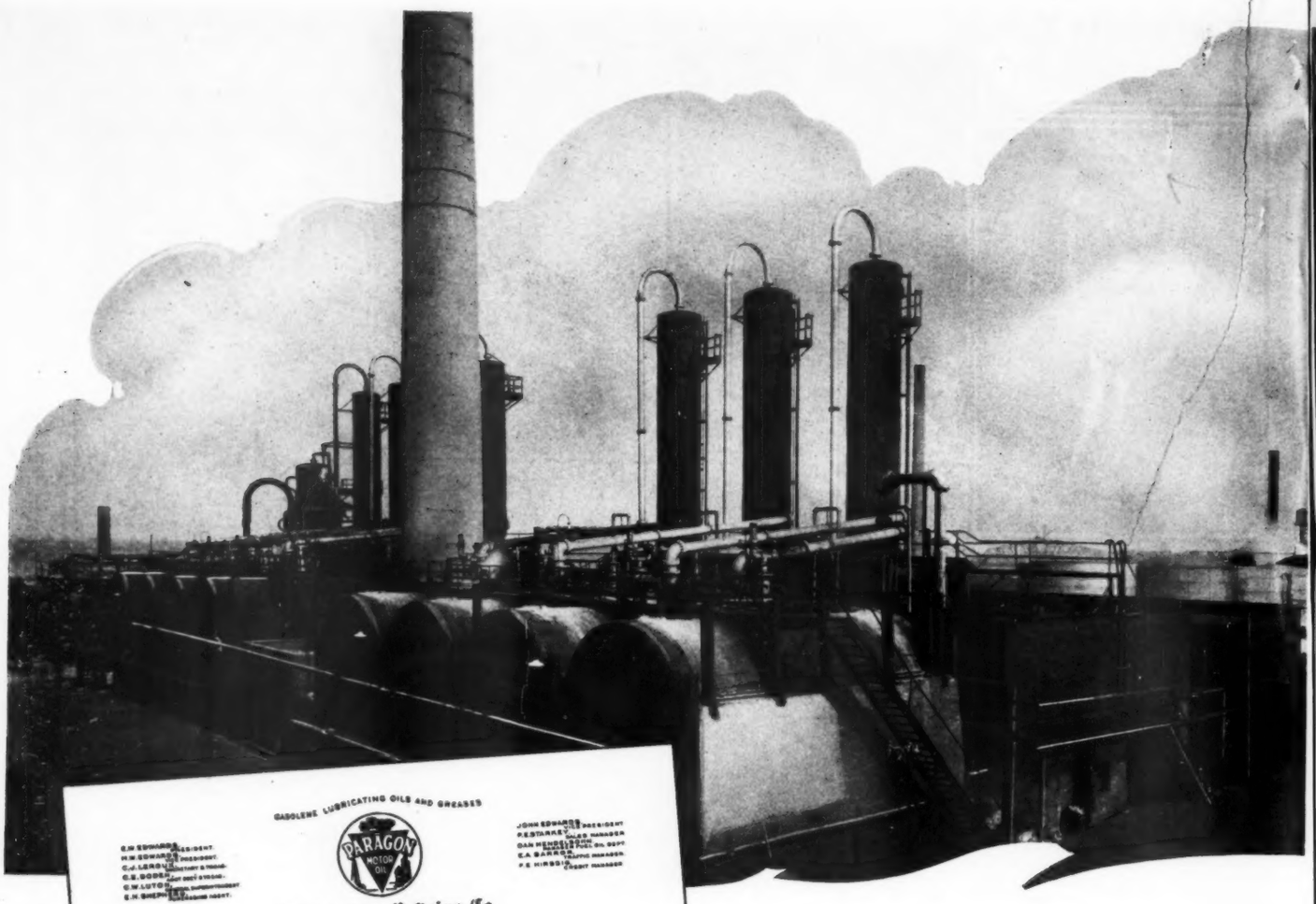

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Very truly yours,

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M. E. Schulz
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THE PARAGON REFINING CO.

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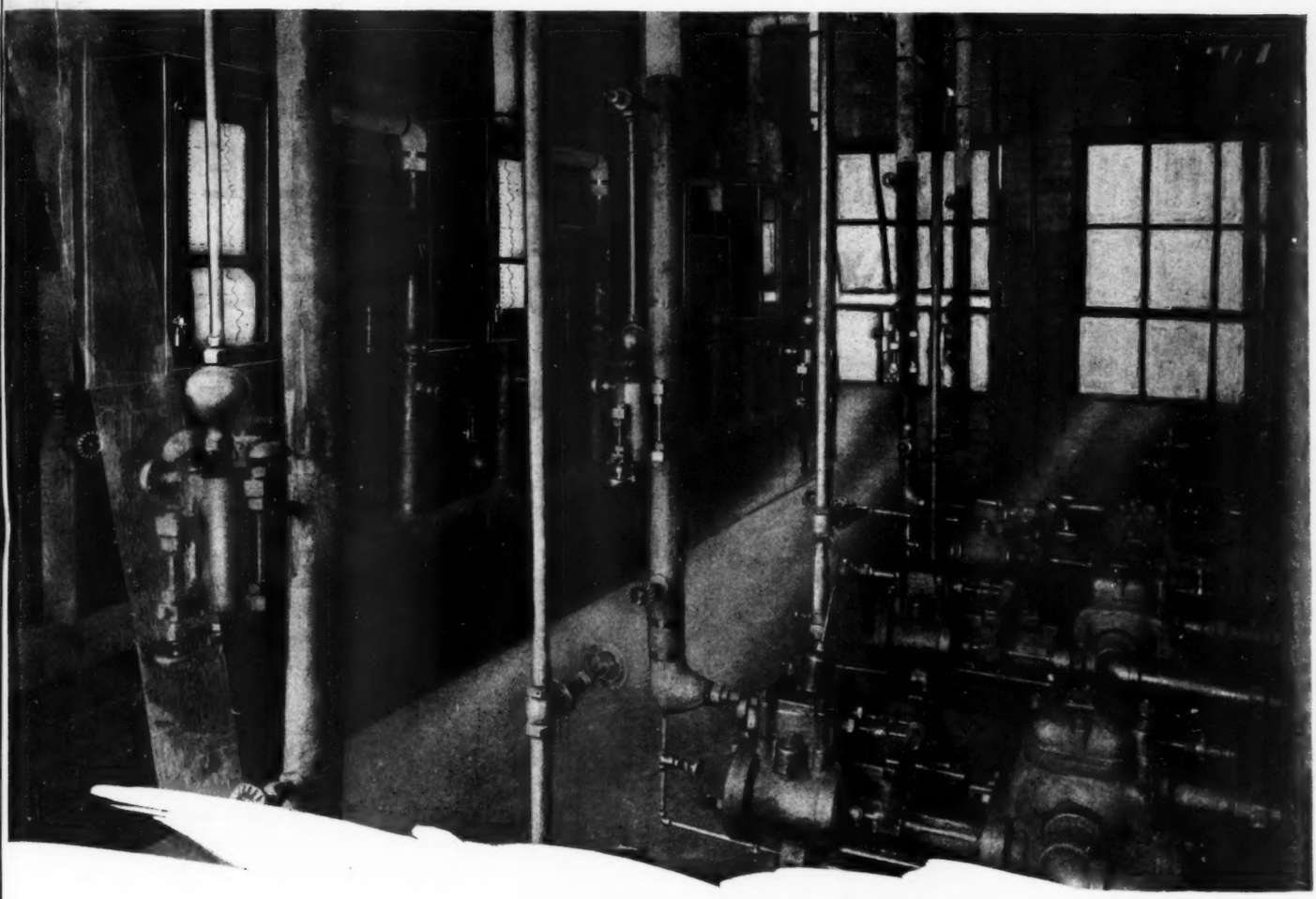
To Measure



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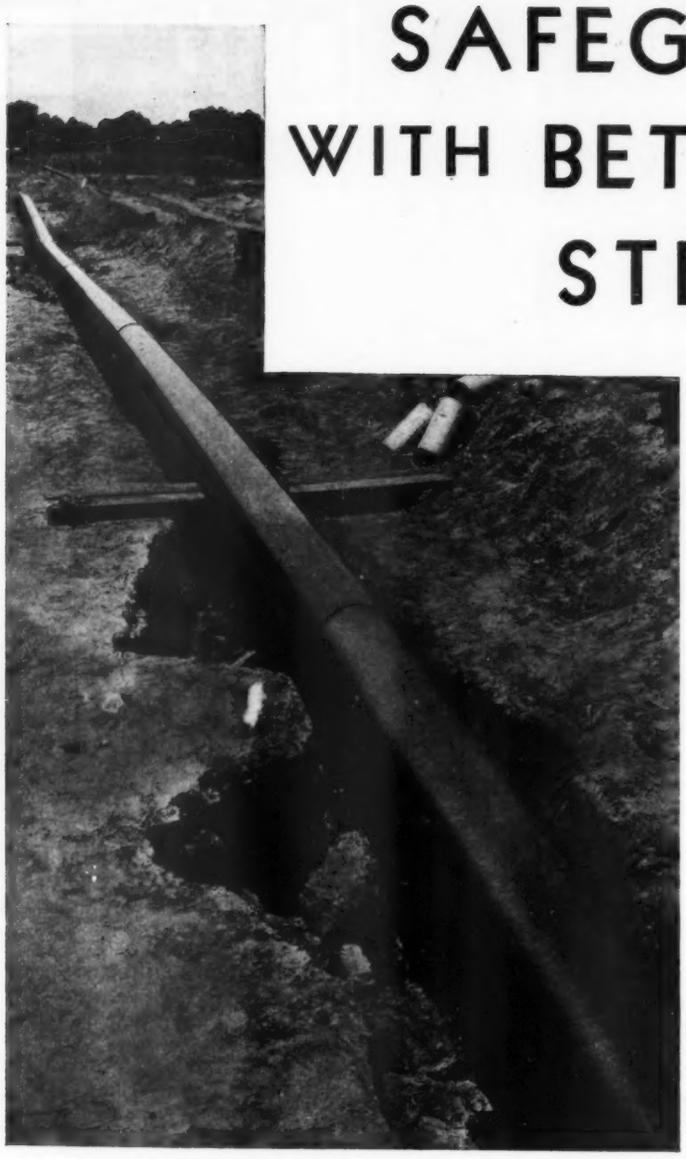

More and more the resources of nature are being exploited—more and more the barriers of distance are being overcome. Railways, waterways, pipe lines, reaching the remotest sections, supply the necessities of life and industry everywhere.

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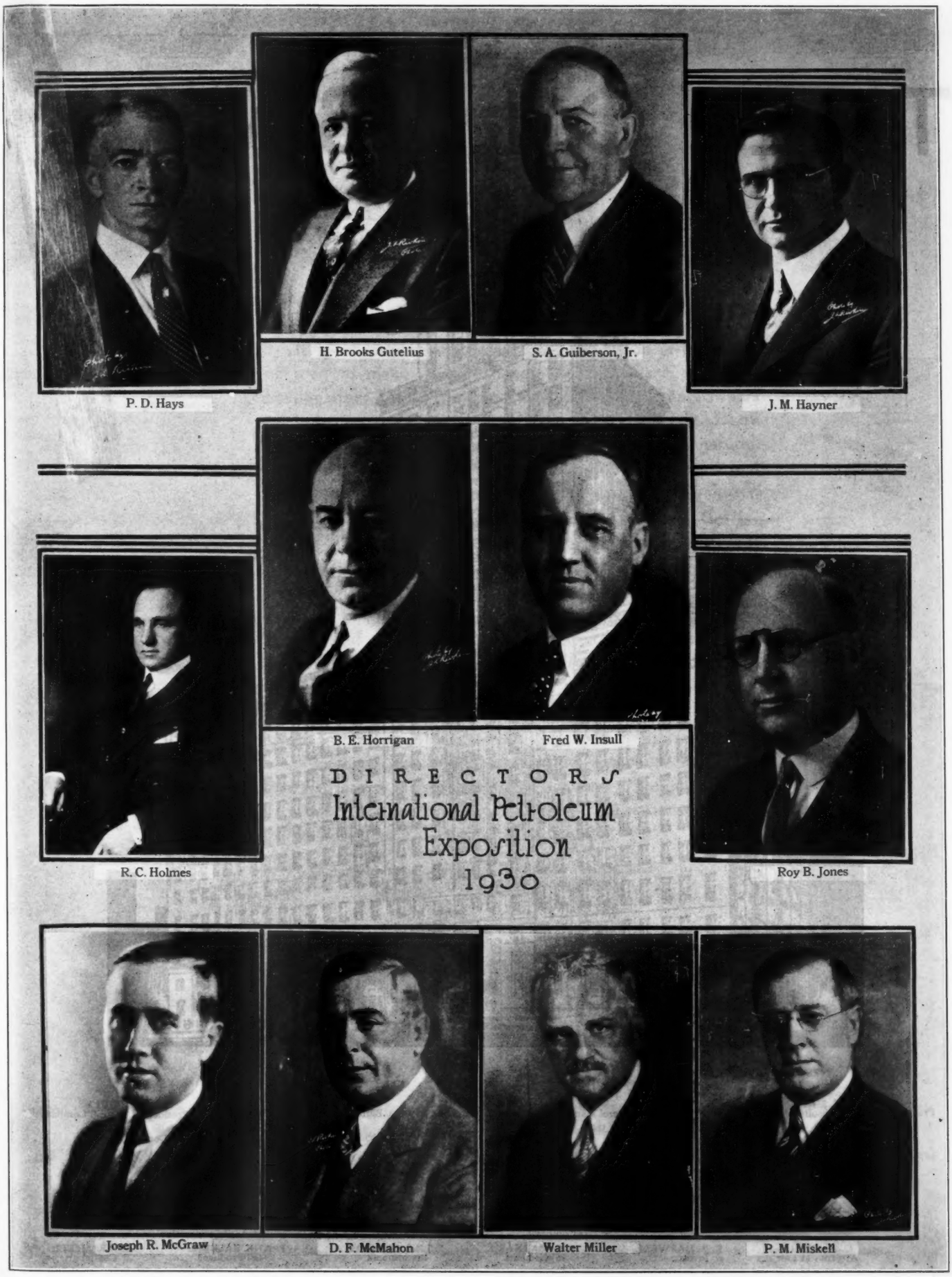
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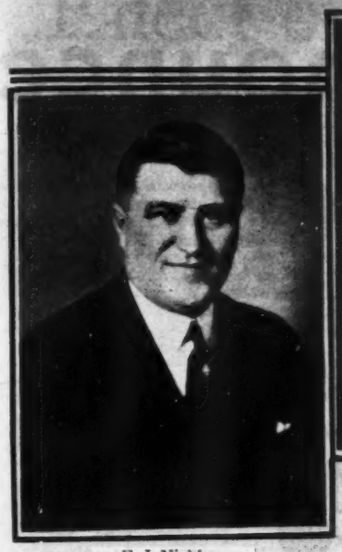

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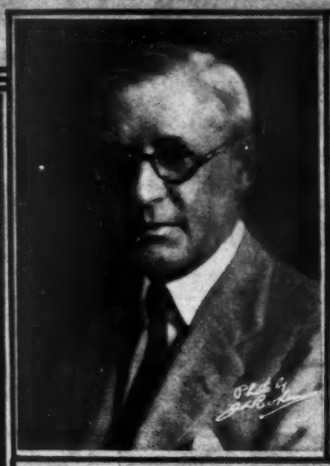

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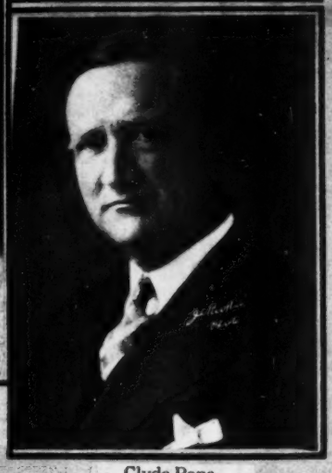

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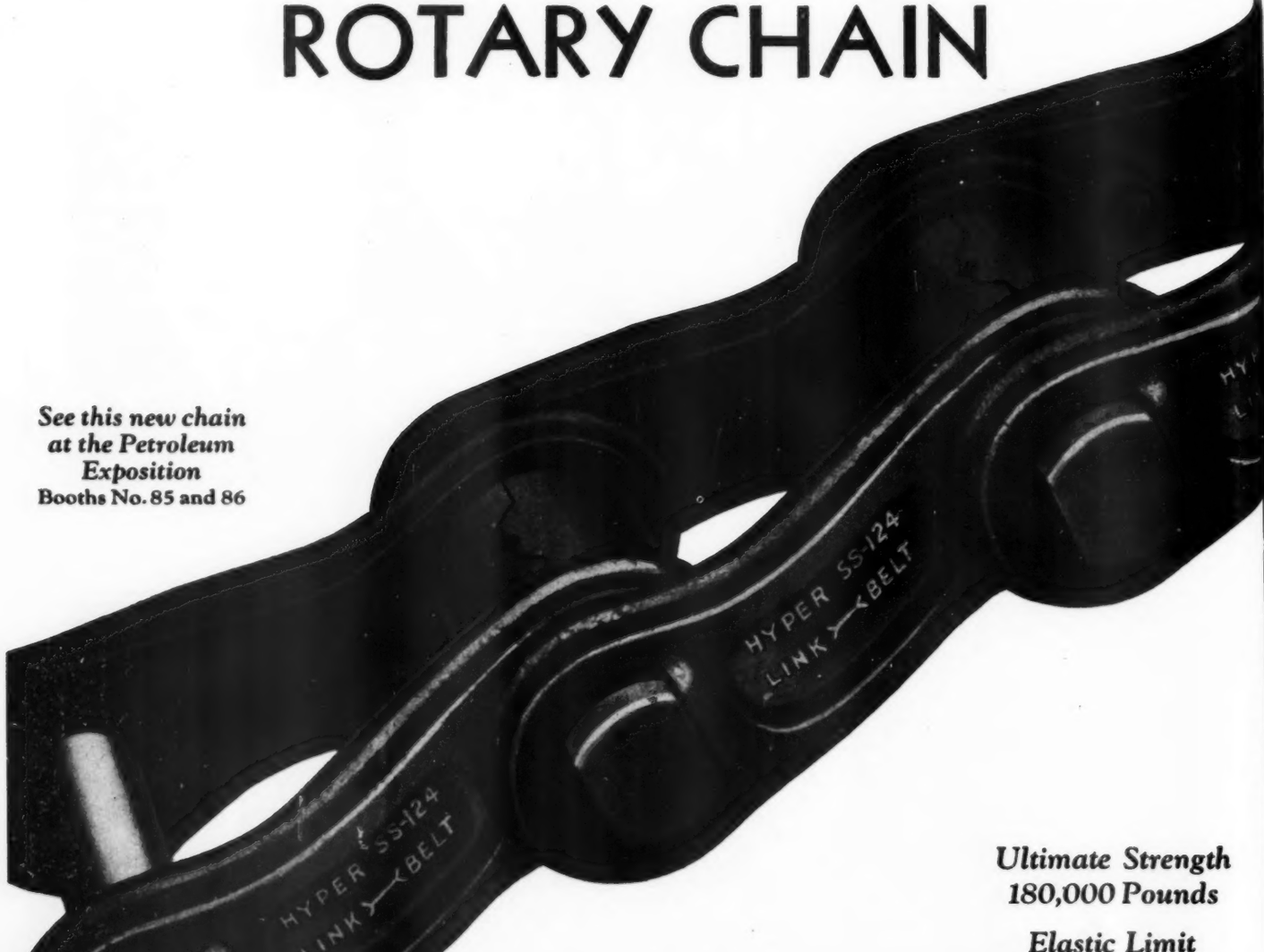

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Effect of Proration on Production

Study of Decline, Potential and Ultimate Output in Several Mid-Continent Areas. Affords Opportunity for Testing Methods

By H. H. Power and C. H. Pishny*

When an oil operator becomes a party to a proration agreement he may wonder, with good cause, whether production prorated today is merely deferred until tomorrow or whether oil might be lost. Various types of evidence obtained from production records when studied quantitatively are of great assistance in arriving at definite conclusions. A study of individual examples cited in this paper leads toward some solution of the problem, particularly when they are considered in the aggregate.

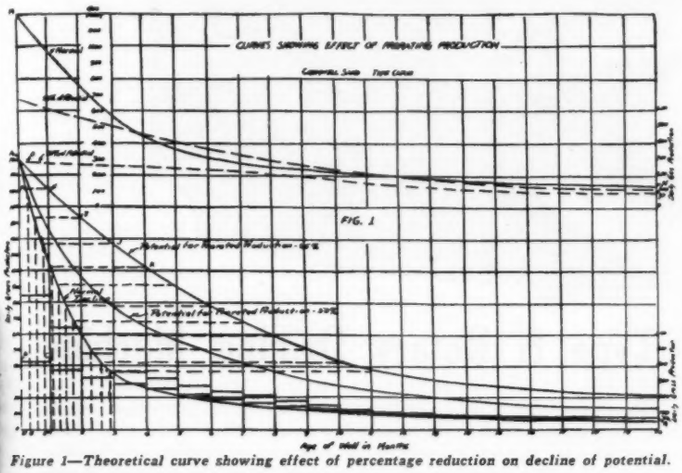


Figure 1—Theoretical curve showing effect of percentage reduction on decline of potential.

Many production curves on various pay horizons were studied. A disappointingly large number of these were of contributory value, but inconclusive. However, there were enough curves of similar type from the Wilcox sand at Earlsboro, Bowlegs, Seminole City, the Cromwell horizon at Little River, and the Simpson dolomite at Valley Center, Kans., from which reasonably definite conclusions were drawn.

Assuming that deferred production is later made up with no increase in ultimate recovery, a curve (Figure 1) shows the normal flowing and pumping life of a composite well, constructed by the family curve method. The initial production of the well shown is 1,700 bbls. daily and the allowed production is 25 per cent. On this basis the average daily allowed rate for the first month is 425 bbls., or the area BCDE, which is equivalent to the area AFDG under the normal decline curve. The potential production for the second month is 1,500 bbls. and the allowed production 375 bbls. daily. By this procedure a potential curve for each succeeding month is obtained (points A, H, I, J and K). If the well is opened it should produce somewhere near its potential curve for a short period and then decline at a more rapid rate than the potential curve. This theoretical analysis is basic. Actual examples exhibiting all points raised by the ideal curve are rare.

Proration in the Mid-Continent area has been effected mostly by leases rather than by individual wells. Hence, a well may produce any proportion varying from zero to its full potential when the allowed lease production is, say, 50 per cent.

Throughout this paper the proration period from February 15, 1929, to May 15, 1929, is called the first period and the proration period from October 16, 1929 (September 29 for the East Earlsboro district), to date (September 1, 1930) is called the second period.

Seminole City Pool

Figure 2 shows the average daily oil production of the Seminole City Pool, also the total number of producing wells and classification of wells. From an extrapolation of production before the first proration period, it is evident that production returned to the original curve, but oil deferred during the proration period does not appear to have been made up in the first few succeeding months. However, oil deferred during the second proration period might have been made up after May 1930, if the field had been opened to capacity, inasmuch as the potential gauges taken during the last half of May show a production peak considerably above the extrapolation of the curve prior to the second proration period.

Increase in Water

Since August, 1929, the rate of increase in the number of water wells has accelerated. The question necessarily arising from a study of the curves are: (1) Is proration responsible for the increase in wells making water, (2) has edge water encroachment become serious, and (3) has proration checked edge water to some extent?

It is not likely that proration is responsible for the increase in water, because the increase set in during a period of full production. It is likely, however, that in general the water problem has become increasingly serious and troublesome. If proration has retarded the water, the influence has not been great.

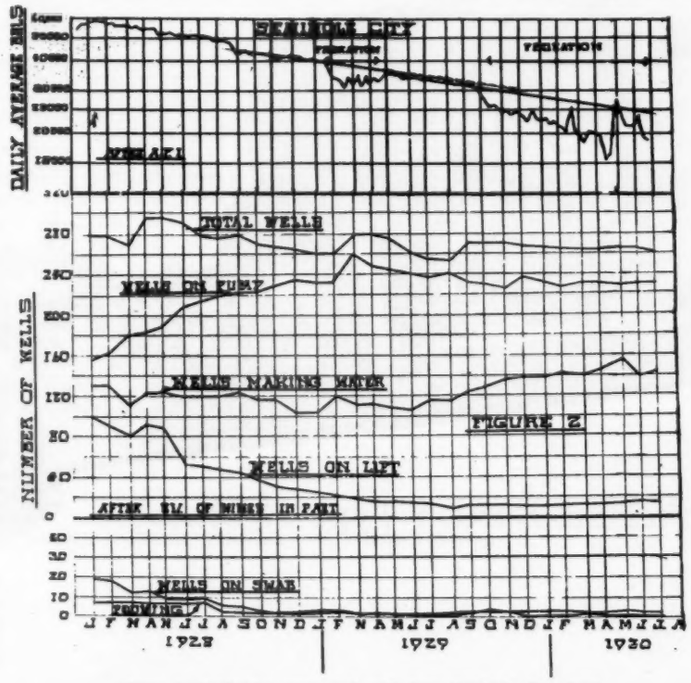


Figure 2—Production curve and well data—Seminole City Pool.

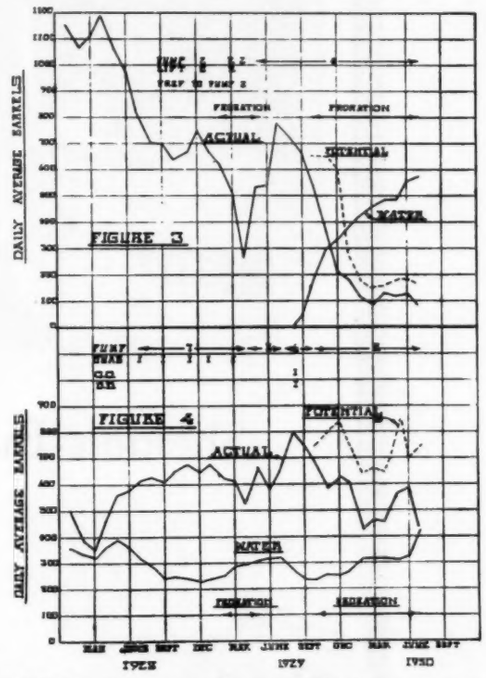


Figure 3—Production curve of a lease in Seminole City, showing increasing water during proration.

Figure 4—Production curve of a lease in Seminole City showing sustained water conditions.

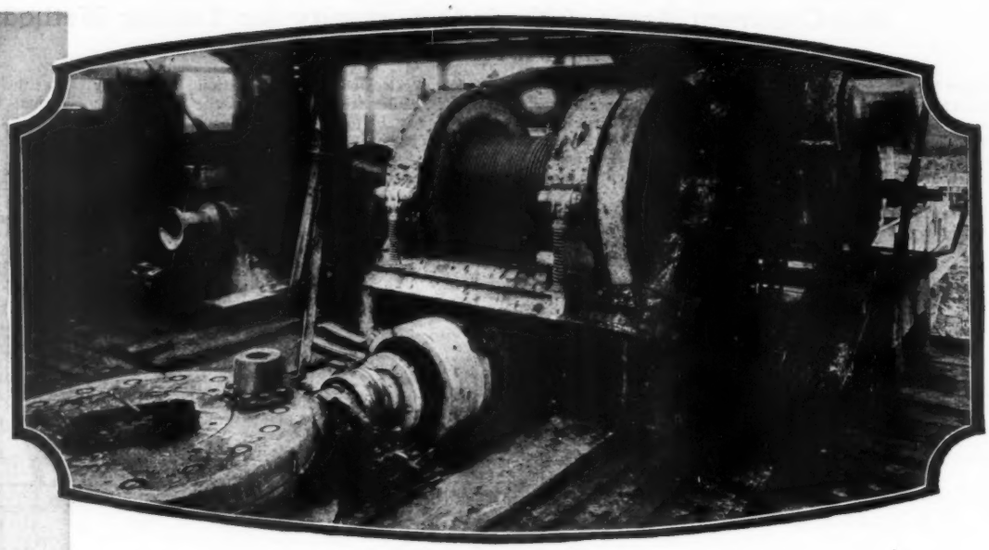
From a number of observations the characteristic Seminole City well increases in oil production just prior to the appearance of edge water. This is followed by a very sharp decline in oil to a relatively low, though in some cases a sustained production. Frequently the wells are entirely watered out.

The lease decline curve (Figure 3) shows total production of two pumping and two gas lift wells from January to April, 1929. In April the two wells on the lift were changed over to pumping, and in May all four wells were pumped. Water, appeared in September and increased rapidly through the second proration period. The peak production in July was probably the result of three factors: (1) Water drive, (2) change over to pumping, and (3) deferred production. This lease curve is similar to the characteristic water drive curve for the field; the production increase, followed shortly by the appearance of water, and as the water rapidly increased the oil production dropped sharply. The encroachment of water is nearly as severe under proration as when producing to capacity.

Figure 4 shows the production curve of a Seminole lease producing water for many months prior to the proration periods. Proration has evidently had no adverse effect on the production of this property, although water production had increase materially in July. The May potential is 50 bbls. in excess of the previous peak, and from 200 to 300 bbls. above the extrapolation of production before the second proration.

A study of daily lease production of several Seminole City properties for which curves are not shown indicates that oil has been lost as a result of proration, since on the open flow gauge production did not reach the expected po-

*Before petroleum division, A. I. M. E., Tulsa, October, 1930.



Sheldon-Burden Type H Rotary Drilling Machine

Above: Type H Machine drilling in Louisiana using gasoline engines for power. Note reverse gear to left of machine and the chain drive to the bailing reel which is mounted back of the draw-works.

A GEAR-driven deep well rotary drilling machine with principal parts mounted on one substantial steel base to provide quick and easy moving and rigging up. Rotary table, draw-works, and steam engine or electric motor are easily removable from base and transported as separate units when desired.

Special high speed steam engine or electric motor and gear box are mounted back of draw-works on the steel base of the machine when steam or electric power is used. When gasoline or Diesel engines are used, the reverse gear is mounted in the corner of the derrick and the chain from it is connected to the rear shaft of the machine. The engines (and double hook-up if desired) are placed on the ground or on a platform along side of the derrick.

The rotary table is shaft driven and controlled by a friction clutch which can be set to slip before the pipe twists off. The friction clutch can be instantaneously engaged or disengaged at any shaft speed, thus making for ease of operation and safety.

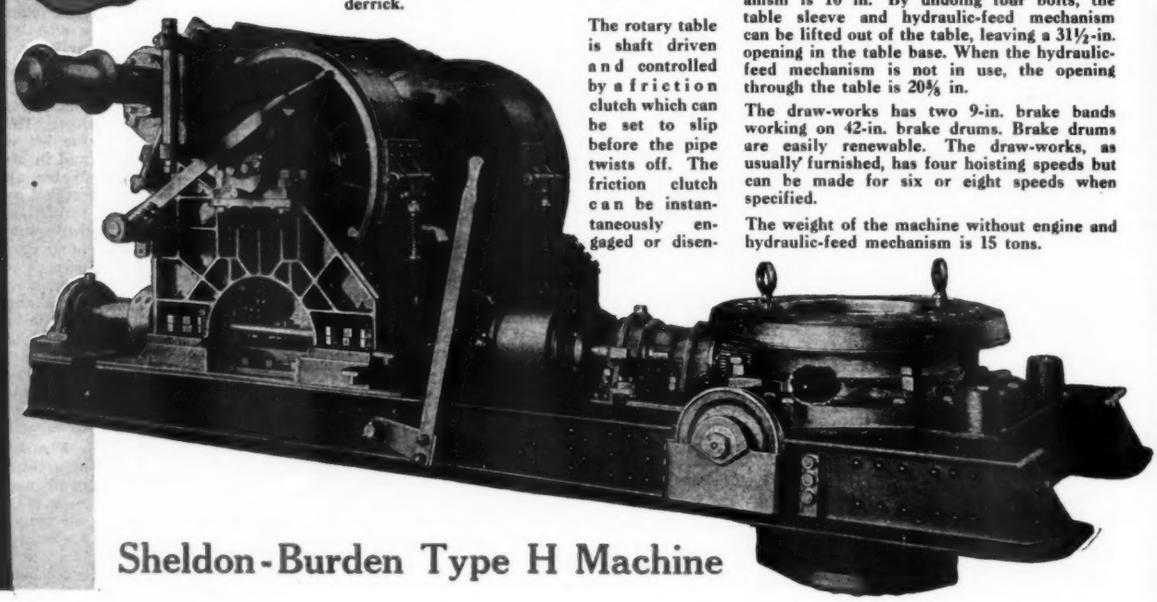
The shaft drive to the table eliminates the usual chain across the derrick floor and permits a wide range of table speeds from the slowest up to 250 r.p.m.

The rotary table may be used as a regular rotary table or with the Sheldon-Burden Type Hydraulic-Feed Mechanism.

The opening through the hydraulic-feed mechanism is 10 in. By undoing four bolts, the table sleeve and hydraulic-feed mechanism can be lifted out of the table, leaving a 31½-in. opening in the table base. When the hydraulic-feed mechanism is not in use, the opening through the table is 20⅝ in.

The draw-works has two 9-in. brake bands working on 42-in. brake drums. Brake drums are easily renewable. The draw-works, as usually furnished, has four hoisting speeds but can be made for six or eight speeds when specified.

The weight of the machine without engine and hydraulic-feed mechanism is 15 tons.



Sheldon-Burden Type H Machine

Sheldon-Burden Oil Well Drilling Accessories

THE hydraulic-feed mechanism with a flush-joint pipe drive head is the most satisfactory method of rotating the drill pipe through a stuffing box. When the hydraulic-feed mechanism is not available, the Short Kelly with drive head, illustrated below, is used. The drill pipe passes through the Kelly and is driven by the drive head in the top of the Kelly.

Sheldon-Burden Deck Stuffing Boxes

The Sheldon-Burden Double or Triple Deck Stuffing Box is used with flush-joint pipe when drilling against well pressures. The stuffing box closes the annular space between the drill pipe and the casing and is so constructed that the drill pipe may be rotated for long periods of time without wearing out the packing. As the lower set of packing is not tightened except when renewing the upper set, it acts as a reserve set, and is always ready to hold the well pressure while repacking the upper set.

By using this system of pressure control, drilling can be carried on against high pressure or even while the well is producing. You can go into the hole or haul out for changing bits or fishing without killing the well. It is not necessary to carry heavy mud to control well pressures, if this system is used. You can drill with clear water or oil circulation against almost any pressure with perfect safety.

We also manufacture snubbing equipment for snubbing into or out of the hole against pressure.

Sheldon-Burden Double-deck Stuffing Box. Additional units can be added if required.

Sheldon-Burden Back-Pressure Valve

The Sheldon-Burden Back-Pressure Valve is placed in the first stand of pipe just above the drill collar. Its use prevents the well from blowing through the drill pipe when breaking connections or going into or coming out of the hole.

Sheldon-Burden Flush-joint Drill Pipe

Sheldon-Burden Flush-Joint Tool Joints have the same outside diameter as the outside diameter of the drill pipe. Their use makes possible a string of drill pipe with the same outside diameter from swivel to bit, and thus eliminates collars. The elimination of tool joint shoulders and collars makes it possible to drill through a stuffing box. The smooth exterior of the pipe and tool joint greatly reduces wear on the stuffing box packing and permits drilling for long periods of time against high well pressures.

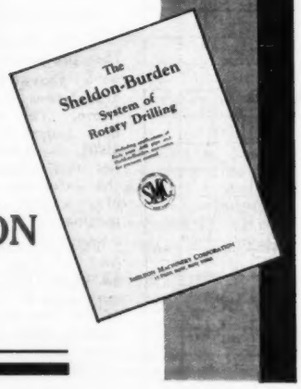
Flush-joint pipe is a great deal stiffer than collared pipe as you can put an inch larger flush-joint drill pipe inside of a given size of casing than is possible when using collared pipe.

Having no collars, it is harder to "stick" or "freeze" flush-joint pipe.

Short Kelly

We also furnish to your order flush-joint casing which can be set against well pressures or heaving conditions.

Sheldon-Burden Back-Pressure Valve.



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tential. In most cases water increased during proration.

Bowlegs Field

The Bowlegs Field production curve (Figure 5) shows strong indications of deferred production being made up after the wells have been opened up. The evidence is the high potential gauge in May, 1930. About a year previous to the first proration the number of wells making water increased sharply as wells were taken off the lift and put on the pump, but this rate increased gradually, up to and through the two proration periods. The total number of wells fell off slightly due to abandonment.

Figure 6 is a production curve of a lease in the Bowlegs Field. Two wells only pumped throughout the entire period shown. There is some indication of water drive in the sustained rate of production before the appearance of water in September, 1930. Water increased during the proration period to a peak in January, 1930, and has declined since then. The potential production increased from the beginning of the proration period to date, and an extrapolation of the curve before proration indicates that production has not been lost. Figure 7 is another production curve in the same pool. It shows a peak production in June, 1929, probably largely due to clean-out operations. There are two potential peaks, one in January and the other in May, 1930. Water appeared in October and as it increased the potential increased. A decline in potential and a flattening of the water curve was followed by a sharp increase in both potential and water. The flattening of the water curve was again accompanied by a drop in potential. This is a case where natural water drive, beginning with proration, operated very much as it probably would have on full production.

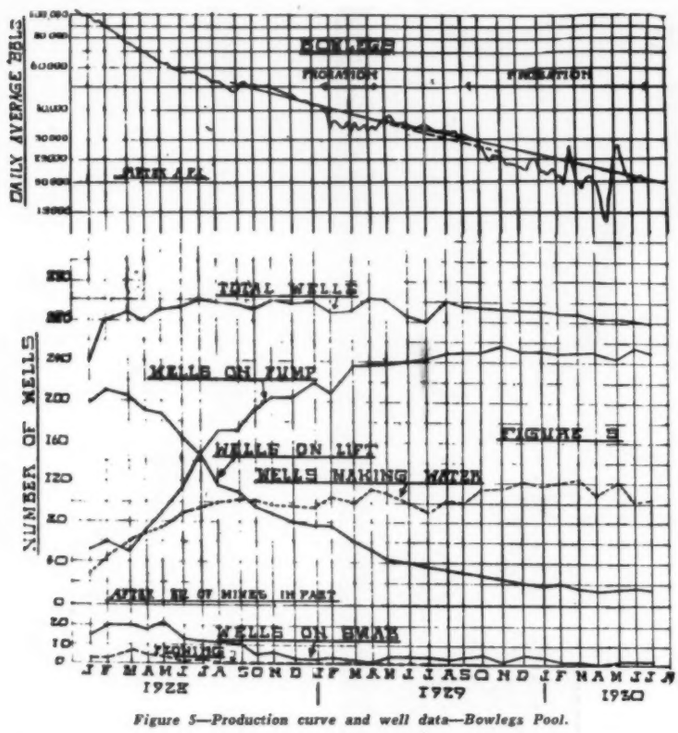

Figure 5—Production curve and well data—Bowlegs Pool.

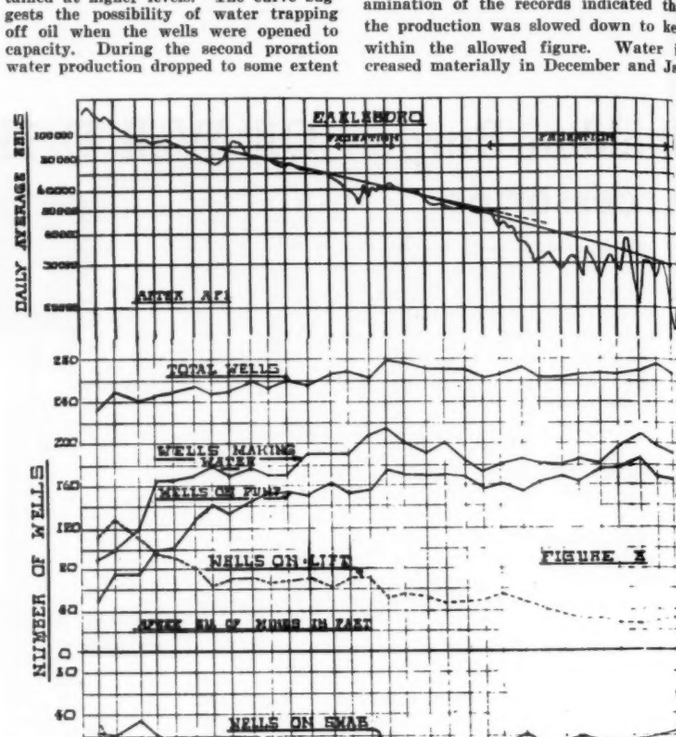

Figure 8—Production curve and well data—Earlsboro Pool.

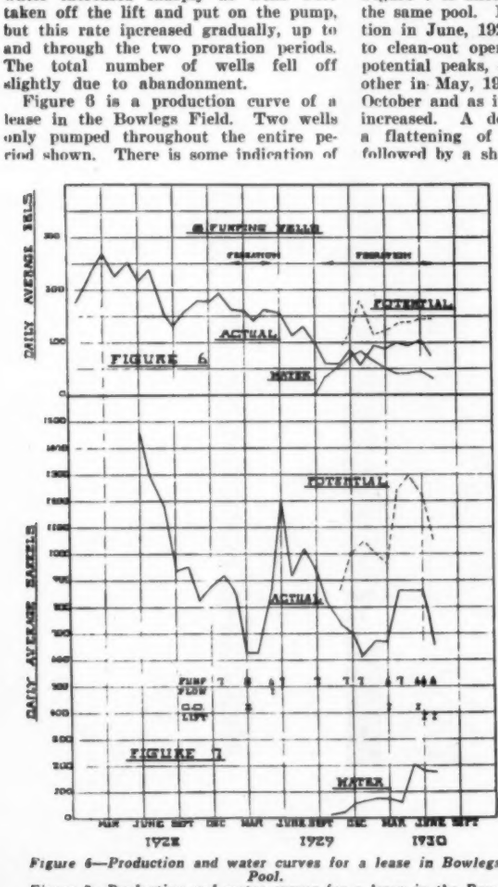

Figure 6—Production and water curves for a lease in Bowlegs Pool.

Figure 7—Production and water curves for a lease in the Bowlegs Pool, showing increase in water during proration.

Earlsboro Curve

The Earlsboro curve (Figure 8) indicates that production comes back above the extrapolation of the old curve. The full 15-day gauge in May, 1930, is 4,500 bbls. per day higher than the extension of the May-October, 1929, portion.

Figure 9 shows a four-well lease in the Earlsboro Pool which in the early life was on lift and since November, 1929, has had three wells swabbing and one pumping.

The sharp increase in water after the first proration suggests that proration has held water back. It is posisible that if the wells had not been opened full after this proration period that the daily rate of allowed production might have been sustained at higher levels. The curve suggests the possibility of water trapping off oil when the wells were opened to capacity. During the second proration water production dropped to some extent when the wells were not pumped as hard as when produced full capacity. The potential gauge was well above what would have been expected on full production.

Figure 10 is a seven-well lease, which for all of 1930 has had four pumping and three swabbing wells. In general the lease is characterized by a consistently declining oil curve and a slowly increasing water curve, regardless of proration periods. There is a flattening in the water curve during the first proration, and a slight decline at the beginning of the second, but neither is definite. The potential gauge in this case is well above the indicated point it would have been on full production. This is evidently a case where deferred production can be secured later and probably some additional oil.

Figure 11 shows the decline curve of an Earlsboro well producing on the gas lift from the Wilcox sand. It is evident that the area BCD representing deferred production will be made up by the increase after March, 1930, in a period of approximately three months. The well flowed between 2½-inch tubing and 6⅝-inch casing over the period shown. When the increase took place in April, 1930, the tubing had been raised, and the input volumes remained the same. In July the average daily production dropped off to some extent, but examination of the records indicated that the production was slowed down to keep within the allowed figure. Water increased materially in December and January, but dropped approximately one-half in February and the increase since has been small. The efficiency of the water drive is thought to have been increased by proration. There is indication that proration has increased the efficiency of the natural water flood.

The lease decline curve, Figure 12, shows the same general characteristics as Figure 11. Two wells only produced from the lease, the remaining pumping

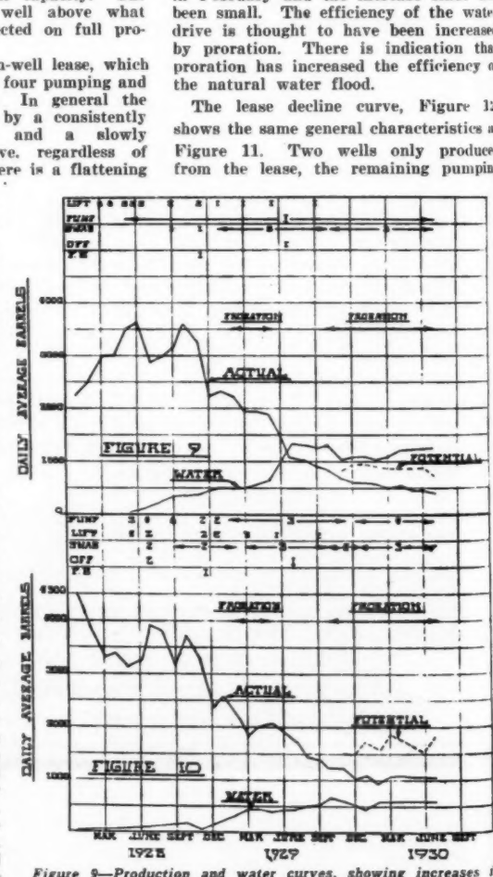

Figure 9—Production and water curves, showing increases in water during proration.

Figure 10—Production and water curves of an Earlsboro lease, showing slowly increasing water.

well exhibiting a more or less flattening production during proration.

The effect on cumulative production may be noted from Figure 13.

Cromwell Sand Wells

Figure 14 shows the actual decline curve of a Cromwell sand well in Little River. While the well was still flowing through 3-inch tubing, proration took effect and the flowing production was maintained considerably higher than the extrapolation of prior production. When the well was put on the pump in December, 1929, potential and actual production gradually increased for two months and then declined slightly. It will be noted from the data tabulated in connection with Figure 14 that changes in pumping operations were relatively a minor factor in the increased production. In general, the curve indicates a better utilization of gas energy and natural water drive. It is also interesting to note that the amount of water declined from 55 bbls. daily in February to 20 bbls. daily four months later.

Figure 15 is another Cromwell sand well in Little River which shows the same general characteristics as the one in Figure 14, with the exception of the clean-out in September, 1929, and the fact that no water has appeared in this well to date.

Kansas Example

Figure 16 shows the actual decline in monthly production of a five-well lease producing from the Simpson dolomite in Kansas. The extrapolation of unprorated production from June to September, 1929, results in the curve EGH. EFG is the graph of actual production under proration, and the area EFG represents deferred oil which it is presumed will be made up over a period beginning with February, 1930, where the actual production curve crosses the extrapolation curve. It will be noted that prior to proration, water production increased from A to B and might have increased at a corresponding rate, say to point C, had production not been restricted. However, with proration a more gradual rate of water increase took place, as evidenced by line BD.

It is significant that in the case of both the lease in Figure 16 and the general curve of a neighboring field producing from the same horizon that the rate of increase of water was appreciably slower after the beginning of proration.

Figure 17 is a rate-cumulative curve of the lease mentioned above. The wells have already produced nearly 400,000 bbls., and there is every indication that the ultimate will be much in excess of the 450,000 bbls. indicated before proration.

Proration sometimes proves disastrous to wells of low structural position. For example: Well A drilled the upper and lower Wilcox sands, having an initial production of 1,000 bbls. of oil and a show of water on the lift. Shortly thereafter this well was shut in for proration and well B, the direct offset, 12 feet higher structurally and with 15 feet greater penetration into the lower Wilcox, came in for an initial production of 2,160 bbls. of oil on the lift. Two weeks after shutting in, well A was opened to find 2,000 feet of water in the hole, which could not be lowered below 500 feet. Later the well made as much as 180 bbls. of oil from the upper Wilcox and 700 bbls. of water from the lower Wilcox.

In many fields, wells of high structural position eventually become edge wells because of encroaching water. This, then, would signal special methods of operation under proration to obtain maximum recoveries. Continuous production under pressure control rather than the alternate production open and closed (intermitting) might delay the appearance of water. In Seminole the water flood line was retarded by use of the gas lift on at least one lease. Pumping wells of similar structural position along the water front reached their economic limit much sooner. Several Earlsboro wells having low fluid levels actually increased in potential and daily production under the so-called intermitting during proration. Apparently the adverse effects of proration in one field cannot be generalized, but it is believed that a close study of field conditions and operating methods is necessary to reduce losses in edge wells to a minimum.

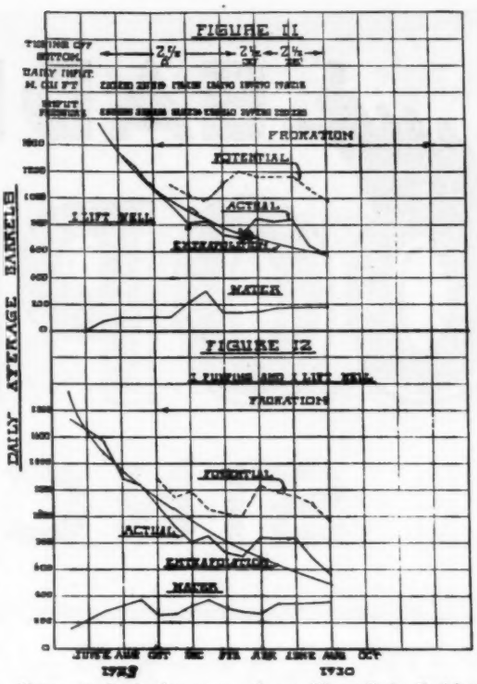

Figure 11—Production curve of gas lift well in Earlsboro, showing operating data.

Figure 12—The lease curve of which the well in Figure 11 is a part.

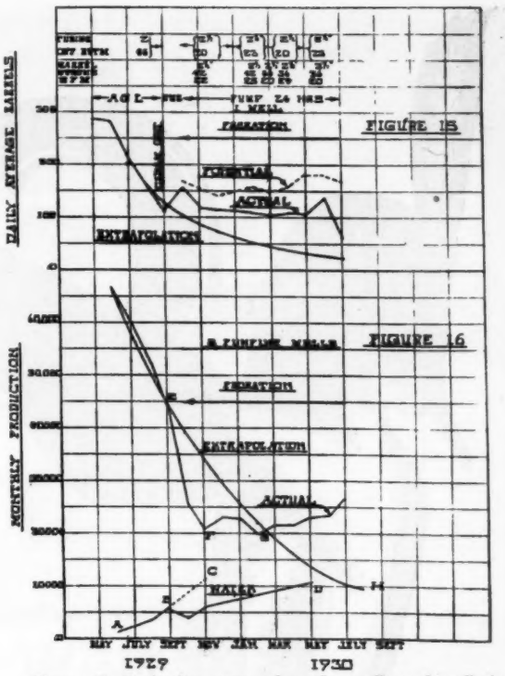

Figure 15—Production curve of a Cromwell sand well in Little River.

Figure 16—Production curve of Simpson dolomite wells in Kansas.

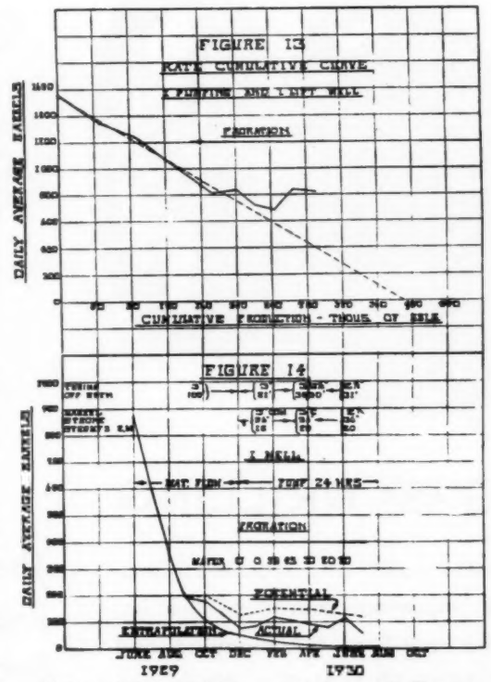

Figure 13—Rate cumulative curve of the lease in Figure 12.

Figure 14—Production curve of a Cromwell sand well in Little River.

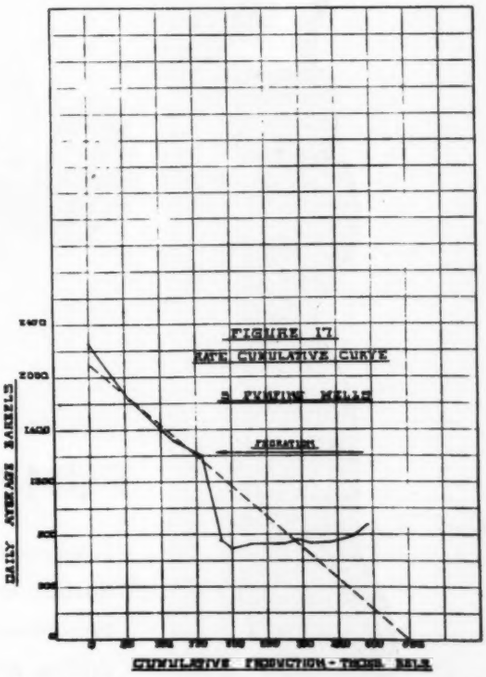

Figure 17—Rate cumulative curve of the lease in Figure 16, showing indicated increase in ultimate due to proration.

Conclusions

In many cases in fields operated under proration agreements, deferred production will be recovered. The flattening of numerous potential production and actual production curves indicates an increase in the ultimate recovery of wells favorably situated. The ultimate recovery of some wells, especially edge wells, will be decreased. It is felt that by a close study of field conditions and operating methods such losses can be materially reduced.

Proration affords opportunity for study and practice in methods of operation. The very fact that a company cannot produce to capacity encourages experimentation in pressure control and water control, which experimentation will doubtless lead to more efficient operation and greater ultimate recovery.

TARIFF COMMISSION NEEDS TIME ON OIL

WASHINGTON, D. C., Sept. 29.—The proposed investigation of prices of imported crude oil directed to be made in a provision of the tariff act passed by Congress and effective June 17, probably cannot be completed within the eight months specified for submitting the report to Congress. It is practically certain that the tariff commission will request an extension of time. Three months from the passage of the act have passed without a beginning of the investigation owing to the appointment of a new commission by the President, which has not been completed at this time.

Informal conferences were held between members of the old commission and oil producers, and officers of the Bureau of Mines, Department of Commerce and Treasury Department in respect to methods of procedure, but as the old commission was to retire, practically nothing was done about that or any other important tariff investigation.

It will be one of the first subjects to be taken up when the new commission begins to function. Following a well-established custom everyone who has any suggestions to make concerning facts to be gathered in response to the tariff act will be allowed to present them at an open hearing.—C. E. K.

LEADING DE
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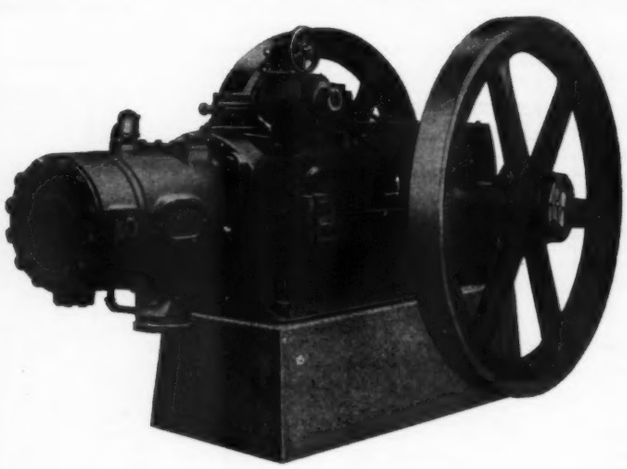
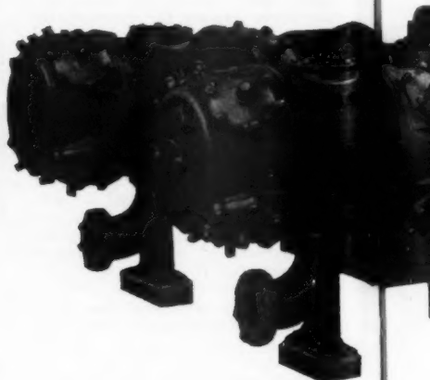
NEW TYPE GA---NEW COMPRESSO





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Lower maintenance costs and increased production are two important results of the improvements in the new Type GA pumping and drilling engine (25 to 50 B. H. P.) When you see this engine at the Tulsa Exposition be sure to pay especial attention to these features:

(1) Timken main roller bearings, (2) Die-forged crank shaft, (3) Sturdy main frame, (4) Improved air valve, (5) Special materials where needed.

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The design of this new line of compressor cylinders was worked out after carefully studying the faults and advantages of all makes in use. Some of the im-

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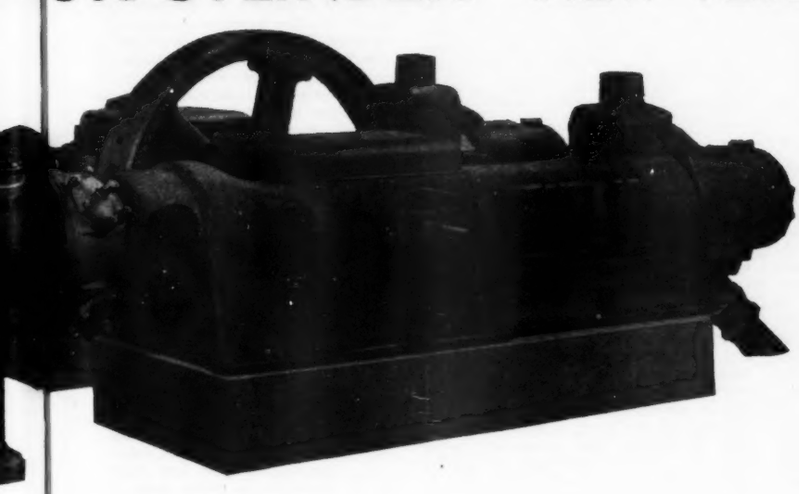
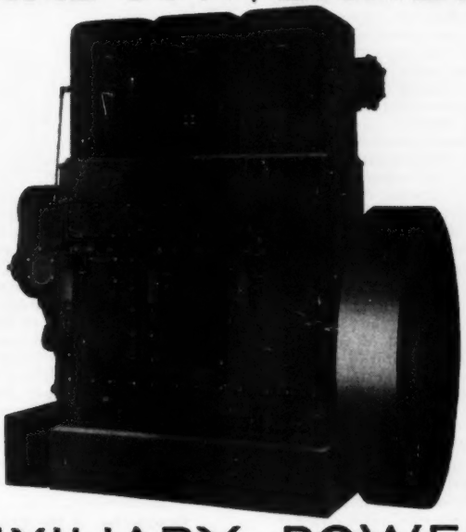




OMPRESSING

provements which give this cylinder greater month-in-and-month-out capacity are:

(1) Valve-in-head construction, (2) Clearance reduced to a minimum, (3) Higher efficiency, (4) Better water cooling, (5) Special materials giving extra strength.

AUXILIARY POWER

The auxiliary engines in a station must be as dependable as the main compressor units. This Type-14 (75 to 200 B. H. P.) convertible engine is compact and reliable. Following are several of the more important features:

(1) Main frame of ample strength, (2) Die-forged crank shaft, (3) Drop forged connecting rod, (4) Separate mixing valve for each cylinder, (5) Silent roller chain driven cam shaft, which is carried on roller bearings.

Hydrogenation Operation Flexible

Commercial Petroleum Process Uses Wide Range of Charging Stocks With Several Finished Products Obtainable

By R. T. Haslam* and R. P. Russell†

The conditions under which commercial hydrogenation has been practiced since the time of Sabatier have been restricted until the last few years to the use of: (1) Hydrogen at substantially normal pressure or 2 or 3 atmospheres above normal, (2) hydrogen of a high degree of purity particularly with respect to such catalyst poisons as sulphur, arsenic and the like, (3) powerful but sensitive catalysts of the type of reduced nickel, and (4) temperatures safely below those at which thermal decomposition of the stock to be hydrogenated takes place. Coal and oil, both always containing sulphur, were not amenable to this type of hydrogenation, and it was therefore restricted to animal and vegetable fats and oils. By eliminating the catalyst and substituting hydrogen pressures 100-fold greater than had previously been used, a high degree of liquefaction was obtained but the oils thus produced contained relatively large percentages of oxygenated bodies of the cresolic type making the oils hard to crack or refine. The able and resourceful research organization of the I. G. Farbenindustrie, through their experimentation, recognized the need of greater hydrogenation intensity than obtainable with hydrogen pressures then commercially permissible and developed a line of sulphur-resistant catalysts which materially speeded up hydrogenation and caused the elimination of all the oxygen from the hydrogenated product. In addition, their long experience in the field of synthetic ammonia enabled them to devise apparatus and methods for better carrying out this type of hydrogenation in a continuous manner.

Some three years ago the Standard Oil Co. (New Jersey), through its development company, joined with the I. G. in the further development and commercialization of this method of treatment, and erected special laboratories for high-pressure experimentation at the refinery of Jersey's subsidiary, the Standard Oil Co. of Louisiana, at Baton Rouge, La. Previous efforts had been largely directed toward the conversion of coal to gasoline or the conversion of asphaltic crudes and residual fuel oils to distillate naphthas and gas oils. Although work along these lines was continued with particular emphasis on the simplification of the process, much of the effort of the Baton Rouge staff, in co-operation with the I. G., was to broaden the use of the process. It is now felt that something more than a process of adding hydrogen to coal and oil has been developed, namely, a flexible method of treating and refining by the use of hydrogen of wide application in the oil industry.

*Vice president and general manager, Standard Oil Development Co. †General manager, Hydro Engineering & Chemical Co.

TABLE 1—SUMMARY OF APPLICATIONS OF HYDROGENATION IN OIL REFINING

Process	Charging stock	Primary result	Approx. volumetric yield of Gasoline %	Burning oil %	Gas oil %	Lub oil %	Total volumetric yield %	Per cent of sulphur in charge removed in process	Gas formation by wt.
1	High sulphur, asphaltic heavy residue	Asphalt and sulphur elimination with simultaneous conversion entire charge into distillate oils	30	..	71	..	101	65-85	2-3
2	Low grade lub distillate	Production premium lub, particularly as regards temp.-viscosity relationship, flash, carbon and gravity	10	..	29	65	104	80-95	0.5-1.5
3	Low grade burning oil distillate	Production of low sulphur premium grade burning oil	30	73	..	..	103	80-95	0.5-2
4	Cracked naphtha	Desulphurization and gum stabilization without the deterioration in yield and knock rating characteristics of acid treating	100	..	..	..	100	50-95	0.5
5	Paraffinic gas oil	Production of low sulphur, low gum, good antiknock gasoline	65-100	..	..	..	70-100	80-95	5-35

TABLE 2—RESULTS OF HYDROGENATING HEAVY FEED STOCK

	Topped Crane Upton crude			Topped Nacona crude		Cracking coil to	
	Feed	Product Ex. 1	Product Ex. 2				
Product—% by volume	..	*107.7	*100.5	...	*101.5	...	*98.9
A.P.I. gravity	23.4	35.8	35.1	24.9	37.5	12.4	23.5
I. B. P.	350	138	...	344	130	340	153
% @ 212	...	4.0	...	...	4.0	...	3.0
% @ 284	...	8.5	...	...	10.0	...	6.5
% @ 374	...	18.0	24.5	...	21.0	...	12.5
% @ 400	...	22.0	30.0	1.0	25.0	0.5	14.0
% @ 460	6.5	33.5	41.0	1.5	36.5	...	20.5
% @ 650	40.5	77.5	79.0	34.0	76.0	34.5	67.0
% @ 700	66.0	87.5	86.5	82.0	85.5	49.0	82.0
% sulphur	1.25	0.198	0.530	0.760	0.108	0.702	0.246
% gasoline*	...	22.0	30.0	...	25.0	...	14.0
*A.P.I. gasoline	...	57.3	57.6	...	60.8	...	56.4
% sulphur in gasoline	.. ...	0.034	0.056	...	0.049	...	0.019

*Does not include a small yield of absorption naphtha produced concurrently.

The work herein presented was carried out by the research staff of the Baton Rouge laboratory, and, while some of the data are from half barrel per day experimental units, practically all of the results given also have been demonstrated commercially in a 100-bbl. per day pilot or demonstration plant erected about two years ago at Baton Rouge along the general lines of the larger plants of the I. G. Farbenindustrie in Germany.

It will be understood that disclosures to be made, and the process and its applications as described are fully covered either by patents issued or by applications for patents.

Description of the Process

In each of the major applications of hydrogenation discussed in this paper the equipment and even the arrangement of this equipment is essentially the same, the results obtained being controlled by suitable alteration of operating conditions. The charging stock together with sufficient hydrogen is pumped into a reaction vessel containing catalyst where at the desired temperature and at about 3,000 pounds per square inch pressure the reaction is allowed to take place. A panoramic view of the first large-scale plant in the United States, at the Bayway, N. J., refinery of the Standard Oil Co. of New Jersey, is shown in Figure 1.

Hydrogen may be produced by any of the usual processes. Since the hydrogen does not need to be sulphur-free, its production from coal or coke by the water-gas process is somewhat simpler than when the hydrogen is to be used for the production of ammonia. Hydrogen may also be produced by liquefaction and distillation of the easily condensable gases from by-product coke ovens, or electrolytically when the economies permit. For the oil industry, with its generous supply of refinery and natural gas, hydrogen may be made by the treatment of hydrocarbons with steam in accordance with the following reactions:

$$(1) \quad CH_4 + H_2O = CO + 3H_2$$

$$(2) \quad CO + H_2O = CO_2 + H_2$$

After scrubbing out the carbon dioxide the hydrogen is of sufficient purity. Catalysts are helpful and are usually used in carrying out each of the above reactions.

The oil and previously compressed hydrogen are mixed together and delivered through heat exchangers to a coil furnace and thence to a catalyst-containing reaction vessel. The degree of hydrogenation is carefully controlled depending on the results desired, control in general being maintained either by alteration of catalyst or of operating conditions.

From the reaction chamber the combined final products and gases pass through heat exchangers and coolers to a high-pressure separator, where the liquid product is separated from the unconsumed hydrogen and other gases. The liquid product is finally reduced to atmospheric pressure and sent to rundown pans.

Much of the sulphur in the feed stock appears as hydrogen sulphide in the unconsumed hydrogen leaving the high-pressure separator. This combined gas may then be scrubbed with oil under pressure to remove the hydrogen sulphide and "boosted" back to full operating pressure in a booster compressor which operates through a pressure interval equal to the pressure drop across the system. This unconsumed gas mixes with the feed oil and fresh hydrogen just before the exchanger inlet.

Since no coke is formed in the process, and since the catalysts employed are extremely rugged, the process is virtually continuous. Runs of as long as eight months' duration have been made in Germany on full scale units, and in the United States laboratory scale and small commercial units have operated continuously for three months and more, the units being shut down only because the equipment was needed for other purposes.

Major Adaptations

There are five adaptations of hydrogenation which appear to be of most immediate importance in oil refining These are:

1. The conversion of heavy, high-sulphur, asphaltic crude oils and refinery residues into gasoline and distillates low in sulphur and free from asphalt, without concurrent formation of coke.

2. The alteration of low-grade lubricating distillates to obtain high yields of lubricating oils of premium quality as to temperature-viscosity relationship, Conradson carbon, flash and gravity.

3. The conversion of off-color, inferior burning oil distillates or light gas oils into high gravity, low sulphur, water white burning oils of excellent burning characteristics, with gasoline being the only other product except for a slight gas formation.

4. The desulphurization, color and gum stabilization of high-sulphur, badly gumming cracked naphthas without

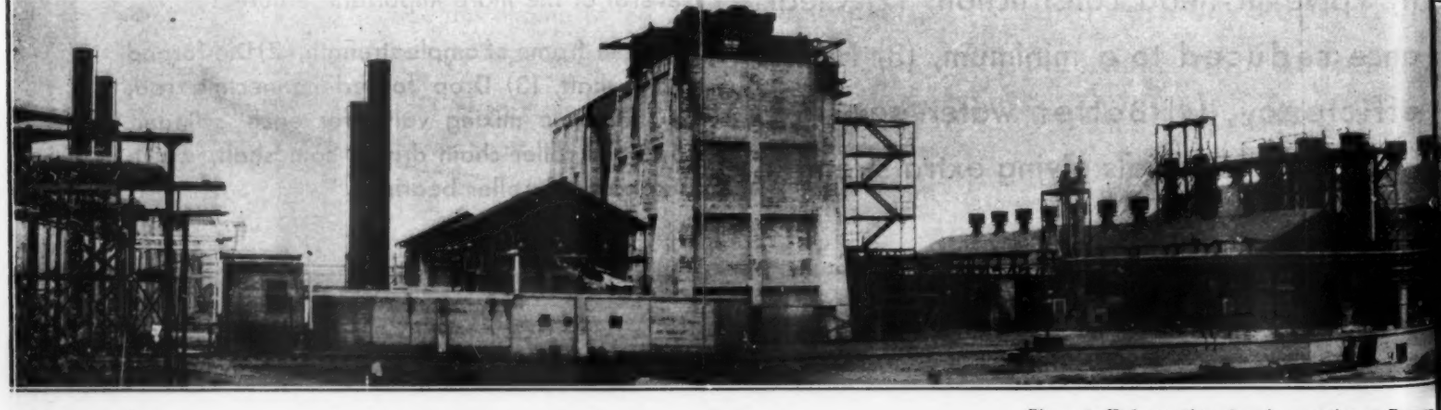


Figure 1—Hydrogenation plant in operation at Bayway

marked alteration in distillation range and without major loss in antiknock value. (It is possible to so operate as to actually better the antiknock quality.)

5. The conversion of paraffin type gas oils into low-sulphur, gum and color stable, good antiknock gasolines without the production of coke or heavy product.

The processes described under (1), (2) and (3) above may all give more than 100 per cent volumetric yield; that is, from 100 bbls. of a residual charging stock the process will give 101 or more barrels of gasoline and gas oil. Similarly, in treating 100 bbls. of a low-grade lubricating distillate, 103 or more barrels of a mixture of gasoline and gas oil together with the improved lub oil will be obtained. In upgrading 100 bbls. of a burning oil distillate, 102 or more barrels of product (approximately 70 per cent burning oil and 30 per cent gasoline) will be obtained. The various processes just mentioned are further summarized in Table 1.

The salient features of these adaptations of hydrogenation are discussed in the following sections.

1.—Conversion of Refinery Residues Into Gasoline and Gas Oil

The conversion of coal or heavy, asphaltic, high-sulphur products into high yields of gasoline is probably the most widely discussed adaptation of hydrogenation. By the present methods of cracking, part of the charge stock is upgraded into light, valuable product in the form of gasoline, while the remainder is degraded into gas, coke and heavy fuel oil, all of lesser value than the feed stock. In contradistinction to the present processes for cracking, hydrogenation may upgrade even up to 100 per cent of the charging stock into lighter and lower boiling point products. This major difference from the other forms of increasing gasoline yield, and the ability to utilize materials practically impossible to handle by other existing methods, tended to make this application of hydrogenation appear spectacular.

For the hydrogenation of heavy asphaltic crudes or residues from these crude oils or from cracking processes, two types of operation may be used. The first of these takes place mainly in the liquid phase and serves to convert the heavy charging stock into 100 per cent or more by volume of product of a more highly parrafinic nature than the charge stock. The gasoline content may represent from 5 per cent upwards of 35 per cent of the liquid product from this first stage in the operation and the balance is a distillate oil. If a higher yield of gasoline is desired, the heavier part of the product may be recycled in the same unit or the total product may be hydrogenated in the vapor phase in a separate unit and converted completely to gasoline.

During liquid phase hydrogenation, the asphalt content may be completely converted and two-thirds to three-fourths of all the sulphur in the charging stock eliminated. This sulphur comes out as hydrogen sulphide and is scrubbed out of the recycle gases as mentioned earlier. Even if the product charged is highly asphaltic and of high sulphur content, the gasoline produced is easily finished to give a low-sulphur gum-stable product. The antiknock value of the gasoline is dependent somewhat on conditions, particularly the type of charging stock—crude residues from Smackover, Venezuela, Colombia and similar crudes giving lower knock rating gasolines than residues from Mid-Continent crude. The gas-oil formed in the liquid phase operation, in addition to having a relatively low sulphur content, cracks to give a gasoline which finishes to specification easily even though the gas oil was produced by hydrogenating a high-sulphur, high-asphalt crude or residue. The workability of this phase of the process has been demonstrated on fuel oil residues from reduced Crane-Upton, Panuco, Venezuela, Panhandle, Mid-Continent, Talang Akar, Long Beach, Alamitos, Smackover, Reagan and other crudes.

In general, it is felt that the early application of this phase of the hydrogenation process will be to run these heavy asphaltic products in the liquid phase to produce small yields of gasoline and the balance gas-oil, with a total volumetric yield of 101 to 104 per cent; the gas-oil to be cracked to produce gasoline in existing cracking equipment or converted into good knock-rating naphtha by hydrogenation as described under Section 5 of this article. If the gas oil is cracked in present apparatus, as much of the cracking plant tar as is needed for the production of steam and power in the refinery may be used as fuel and the balance returned to the hydrogenation unit. In this way the greatest use of present refinery facilities and gasoline yield can be obtained with a minimum hydrogen consumption. Depending upon the stock and operating conditions, a yield of 80 to 90 per cent of gasoline may be obtained by this method. If none of the cracking coil tar were burned as fuel, the combined yield of gasoline would be approximately 100 per cent.

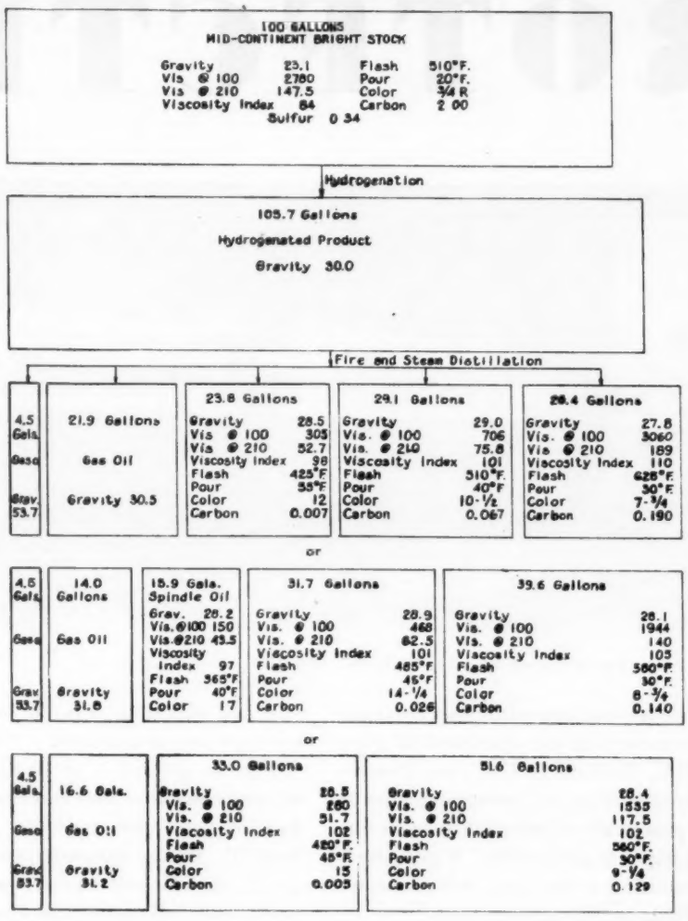


FIGURE 2

Some typical examples of the liquid phase operation are given in Table 2 in which a comparison is shown of the inspections of three heavy feed stocks before and after hydrogenation. All the asphalt present in the charge was converted into more paraffinic type products, about two-thirds of the sulphur eliminated and the entire product was a yellow distillate oil. As another example, it was found in hydrogenating a 7.2 A. P.I. gravity cracking coil tar, that the sulphur was reduced from 2.77 per cent in the charge stock to 0.49 per cent, in the total overhead, and this product contained 22.1 per cent of gasoline of 0.071 per cent sulphur without further treatment.

2.—Improvement of Low Quality Lubricating Distillates

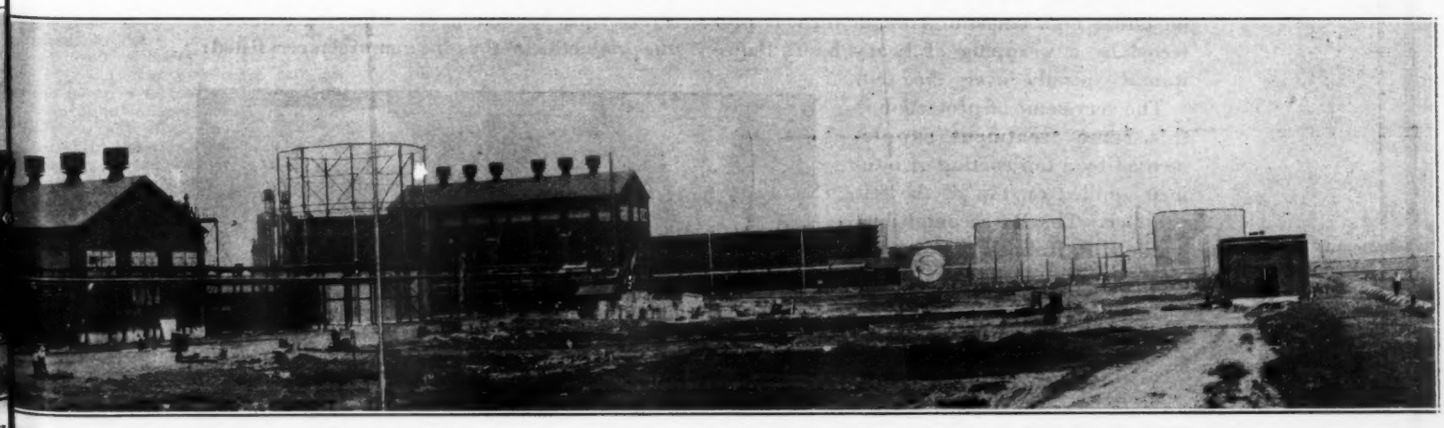
With the improvement in the internal combustion engine and particularly with the rapid expansion in air transportation there has developed an insistent demand for better motor lubricants. The modern motor lubricating oil, to give good service, should have (1) a flat temperature viscosity relationship, (2) a high flashpoint, (3) a low Conradson carbon content (to give minimum carbon deposition in the motor), and (4) should flow sufficiently free at low temperatures to permit adequate lubrication under extreme conditions. With present refining methods it has not been possible to meet all of these requirements in a single oil, even from the best crude oils available.

TABLE 4—FINISHING OF CRACKED SMACKOVER NAPHTHA BY HYDROGENATION

Charge	Cracked Smackover naphtha	Hydrogenated product (100% yield)
Total product—		
Gravity (A.P.I.) ..	46.4°	51.9°
Sulphur	0.395%	0.019%
Doctor	Does not pass	Passes
Color	Straw	+25 Saybolt
I.B.P.	124° F.	*134° F.
Per cent at 212° F.	14.5	12.0
Per cent at 302° F.	40.5	45.0
Per cent at 374° F.	64.0	73.5
Per cent at 400° F.	71.5	82.0
F.B.P.	540° F.	502° F.
Gasoline—		
Gravity (A.P.I.) ..	53.9	55.3
Sulphur	0.188%	0.006%
Porcelain dish gum	12 mgs.	1 mgs.
Copper dish gum .	21 mgs.	4 mgs.

*The change in initial boiling point is due to not fully recovering the low boiling fractions from the recycle gases.

A considerable amount of work has been done to determine whether by the use of the hydrogenation process, all of the above characteristics could be combined in a single oil. In general, hydrogenated paraffinic lubricating oils with a flat temperature-viscosity relationship are characterized by unusually high flashpoints and low Conradson carbon content. The high quality of these hydrogenated lubricating oils predicable from the laboratory inspection has been substantiated in actual engine tests. In view of the possibility of producing essentially the same premium quality lubricating oils from a wide variety of inferior lubricating distillates, it would seem that hydrogenation will have an important in-



N. J., refinery of the Standard Oil Co. (New Jersey).

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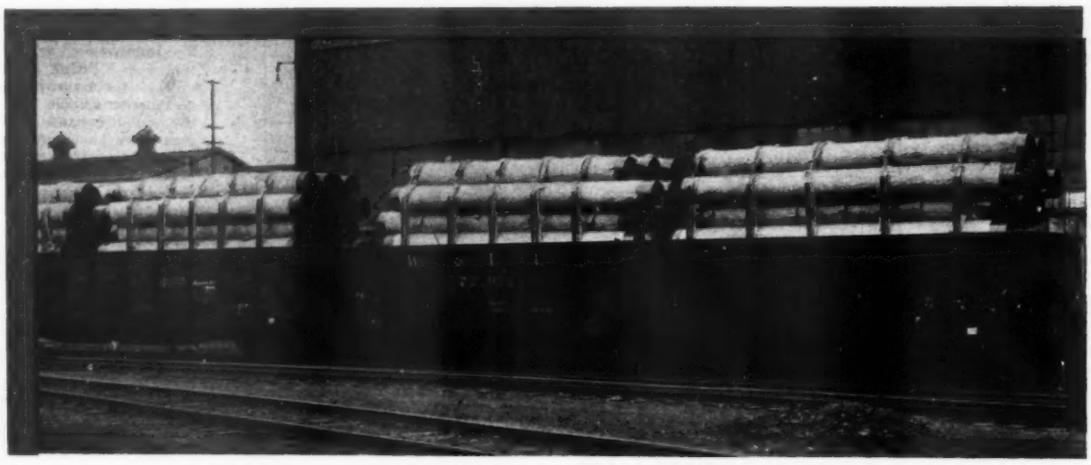


Pipe coated and wrapped at Lorain, Ohio. Shipped to Aromas, California

HIGH maintenance and reconditioning costs are no longer necessary in the operation of pipe lines. The Hill, Hubbell & Company Process of mechanically coating and wrapping pipe at the mill has practically eliminated these drains on operating expense and profits. It gives such thorough protection to the pipe that corrosion is a negligible factor in up-keep costs.

Thousands of miles of pipe, mechanically coated and wrapped at the mill by the Hill, Hubbell & Company Process, are now in operation throughout the country giving trouble-free service. This process is now available for the production of six leading pipe mills.

By the Hill, Hubbell & Company Process the pipe is first cleaned of all mill scale and rust. When the primer is applied the pipe is *warm*, to secure perfect coverage and adhesion of the primer. Following the primer *two hot* coats of BITURINE ENAMEL are applied and in the same operation the felt, perfectly spaced, is wound on under high tension. This, in turn, is protected by a wrapping of heavy Kraft Paper wound spirally over the felt.

The very acme of protection is this same treatment supplemented by a top coating of bitumen applied on top of the felt wrapper. This is accomplished by the Hill, Hubbell & Company machines at no additional labor cost and makes its superior worth available at the bare cost of material.

Pipe so covered is proof against the hazards of transportation and reaches the field in the best of condition, ready to string, weld and backfill. In the ground, pipe so protected is proof against soil stress, water, alkalis, soil acids and all other ever-present corrosive agents. It gives years on years of service without reconditioning expense. Owners and operators appreciate the advantages of and savings effected by pipe mechanically coated and wrapped at the mill by the Hill, Hubbell & Company Process and are specifying it in increasing quantities.

The advantages of this method of applying protection are available for any coating materials of reputable quality, as well as Biturine products.

Plants for the mechanical coating and wrapping of pipe by the Hill, Hubbell & Company Process are located in the following cities for the production of the pipe manufacturers listed:

Felt and kraft wrapping applied under tension

fluence in this field of refining in the future.

It has been found that by hydrogenation it is possible to make marked improvement in a number of inferior quality lubricating distillates. Under the best conditions for this type of hydrogenation there is produced from 100 bbls. of lubricating distillate 103 to 104 bbls. of hydrogenated product containing from 60 to 85 bbls. of lub oil, somewhat lower in viscosity but much more paraffinic than the charge, together with about 10 bbls. of gasoline and from 10 to 30 bbls. of gas oil. About 80 to 90 per cent of the sulphur in the feed stock is eliminated during hydrogenation.

Figures[1] 2, 3, 4 and 5 give yield charts showing the products obtained using various charging stocks.

3.—Production of High-Grade Kerosenes

High-sulphur, low-gravity, off-color kerosene distillates and poor quality light gas oils may be hydrogenated to produce high yields of water-white distillates and burning oils of high quality. In general these products meet specifications as to sulphur, color, and smoke tendency with no other treatment than reduction to flash and viscosity.

In this adaptation of hydrogenation it has been found desirable to start with a stock somewhat more viscous than the desired finished oil, with the result that in many cases the actual yield of finished high-grade burning oil has been greater than the amount of low-grade material of kerosene boiling range and viscosity originally present in the charging stock. Liquid yields are from 100 to 105 per cent by volume and the product

TABLE 6—PRODUCTION OF ANTIKNOCK GASOLINES BY HYDROGENATION

	Mid-Cont. Light Gas Oil	West Texas Cycle Gas Oil	
Feed stock—			
A.P.I.	37.4	30.3	
Initial	474	400	
%@460	2.5	56.0	
%@550	89.0	....	
%@650	....	....	
%@700 or F.B.P..	618	612	
Sulphur	0.153	0.192	
Aniline point	161	102	
Hydrogenated product—			
Yield—% by vol...	89.9	94.5	88.0
A.P.I.	55.4	39.8	42.3
Initial	95	110	109
%@212	35.0	13.5	12.0
%@284	54.0	25.0	32.5
%@356	72.5	....	....
%@374	79.0	50.5	70 5
%@400	87.0	70.5	90%@392
F.B.P.	428	436	412
Knock rating as % iso-octane in n-heptane	72.6	82.2	85.0
Dissolved gum	17.7	9 0	....
Sulphur	0.013	0.005	0.006

from 65 to 85 per cent of high-grade burning oil, the remainder being a gasoline. This is shown for a typical case in Figure 6.

A survey of a number of feed stocks has shown that burning oils at least equal to those obtained from straightrun Mid-Continent or Pennsylvania distillates can be obtained from such stocks as California, Coastal, heavy distillates from cracked Mid-Continent gas oils and a number of others. Table 3 shows a comparison of the results obtained with various feed stocks.

In Table 3 the quality of the burning oils produced may be judged by the gravity of the "400" refined oil viscosity oil produced, this generalization having been proven by numerous lamp tests. Thus a cut of 400 viscosity and 42 A.P.I. gravity would give a burning test about equivalent to that of a 400 viscosity cut from Mid-Continent crude, and a cut of 400 viscosity of 45 to 46 A.P.I. gravity would be equivalent to a Pennsylvania fraction of the same viscosity. All the hydrogenated burning oils have been found to be very stable.

The following points are worthy of note in Table 3:

1. The sulphur elimination is from 85 to 90 per cent of the total despite the wide variety of sulphur forms encountered in the different stocks used. On a large scale 98½ per cent of sulphur has been eliminated from a West Texas gas oil.

2. Charging stocks of from 450 to 600 viscosity usually give the best yields (75 to 85 per cent) of 400 viscosity finished refined oil.

3. In contradistinction to other methods of burning oil improvement now available, none of the charge is degraded. The entire hydrogenated product consists of burning oil and gasoline, both of which are more valuable than the charging stock. In other words, hydrogenation actually reconstructs the undesirable constituents present in the feed rather than separating them out by some such method as solvent extraction.

4. All the stocks, although differing widely in initial chemical characteristics, after hydrogenation equal the very highest A.P.I. gravity natural burning oils in physical characteristics. Analysis indicates that by hydrogenation (a) olefines are almost completely eliminated, (b) the greater portion of the aromatics are converted into naphthenes and paraffines and (c) there is very little apparent effect on the naphthenes, probably since new naphthenes are formed from aromatics in the charge, thus off-setting the improvement brought about as the original naphthenes are changed into more paraffinic compounds.

4.—Treatment of Naphthas for the Elimination of Sulphur and Gumming Tendency

In view of the remarkable facility with which catalytic hydrogenation eliminates sulphur, this process has been used for the treatment of natural or cracked naphthas. By a mild hydrogenation a high-sulphur, high-gum and unstable gasoline may be rendered stable, with about 50 per cent of the sulphur eliminated under such conditions of operation that the antiknock value is lowered only to about the same extent as would result from a slight chemical treatment. This phase of the process would be carried out in such a way that no appreciable change would be made in the boiling range of the naphtha. The process may also be so operated as to almost entirely eliminate sulphur from a high-sulphur, cracked naphtha, with a small increase in some cases an actual decrease in knocking tendency. Depending upon conditions of operation, this treatment eliminates from 65 to 98 per cent of the sulphur in the feed stock and gives a gum and color stable naphtha which, after a light wash with caustic soda, passes corrosion and doctor tests. The following tables show character of stock charged and finished product. Improvement in color, gum and sulphur is readily apparent.

TABLE 3—RESULTS OF HYDROGENATING VARIOUS BURNING OIL DISTILLATES

	Low grade Mid-Continent	Low grade Mid-Continent	Alamitos California	Long Beach, California	West Texas light gas oil	Cracking coil distillate	Colombia	Cracked Mid-Continent	West Texas Diesel fuel
Feed stock—									
Gravity: °A.P.I.	40.2	41.1	36.4	36.8	35.3	39.0	36.1	39.7	30.5
Viscosity*	485	480	750	750	705	335	600	400	595
Sulphur, per cent	0.221	0.285	0.550	0.240	0.761	0.157	0.202	0.334	0.487
% "400" Vis. oil in original†	58	90	38	40	30	100	30	100	40
A.P.I. of "400" Vis. oil	41.2	40.0	40.0	39.9	39.1	39.0	38.9	39.7	35.1
Vis. of "400" Vis. oil*	400	450	380	400	410	335	400	400	400
RESULTS OF HYDROGENATION									
Volumetric recovery‡	106	100	106	99	102	100	101	103	105
A.P.I. of total product	48.9	52.1	46.0	45.6	54.2	45.8	51.6	47.2	51.0
% Sulphur of total product	0.006	0.011	0.022	0.025	0.026	0.024	0.029	0.014	0.019
% "400" Vis. oil in ttl. prod.	83	75	65	60	58	85	73	80	65
A.P.I. of "400" Vis. fraction	46.0	46.7	43.0	43.3	45.5	43.8	44.1	44.4	44.0
Vis. of "400" Vis. fraction*	415	380	410	400	375	335	355	360	360
Sulphur, per cent	0.007	0.012	0.013	0.012	0.018	0.022	0.013	0.025	0.015
Flash °F. (Abel)	107	100	122	120	109	128	104	106	115
Color (Saybolt)	22	25	17	25	25	25	18	25	..
% sulphur elimination	97	96	96	90	97	85	86	96	96
Improvement in A.P.I. of "400" Vis. fraction	4.8	6.7	3.0	3.4	6.4	4.8	5.2	4.7	8.9

*Saybolt Thermo. Refined oil viscosity at 60° F. †The term "400" Vis. oil is used to denote the fraction of about 400 viscosity and above 100° F. Abel flash. As will be noted the true viscosity of most of the cuts actually made was slightly above or slightly below 400. ‡Not including a small yield of recovery naphtha produced concurrently.

TABLE 5—FINISHING OF CRACKED MID-CONTINENT NAPHTHA BY HYDROGENATION

	Feed Cracked Naphtha	Acid Treated 7-lb. Acid/bbl.	Hydrogenation No. 1	Hydrogenation No. 2
% 400 F.B.P. Gasoline based on feed	71.5	64.2	65.4	65.7
Gravity (A.P.I.)	53.9	53.1	56.1	44.3
Sulphur (per cent)	0.39	0.15	0.15	0.02
Porcelain Dish Gum (mgs.)	12	8	3	3
Accelerated Gum (mgs.)	51	37	3	4
Anti-knock value as % iso-octane in n-heptane	65.3%	62.2%	63.8%	78.0%

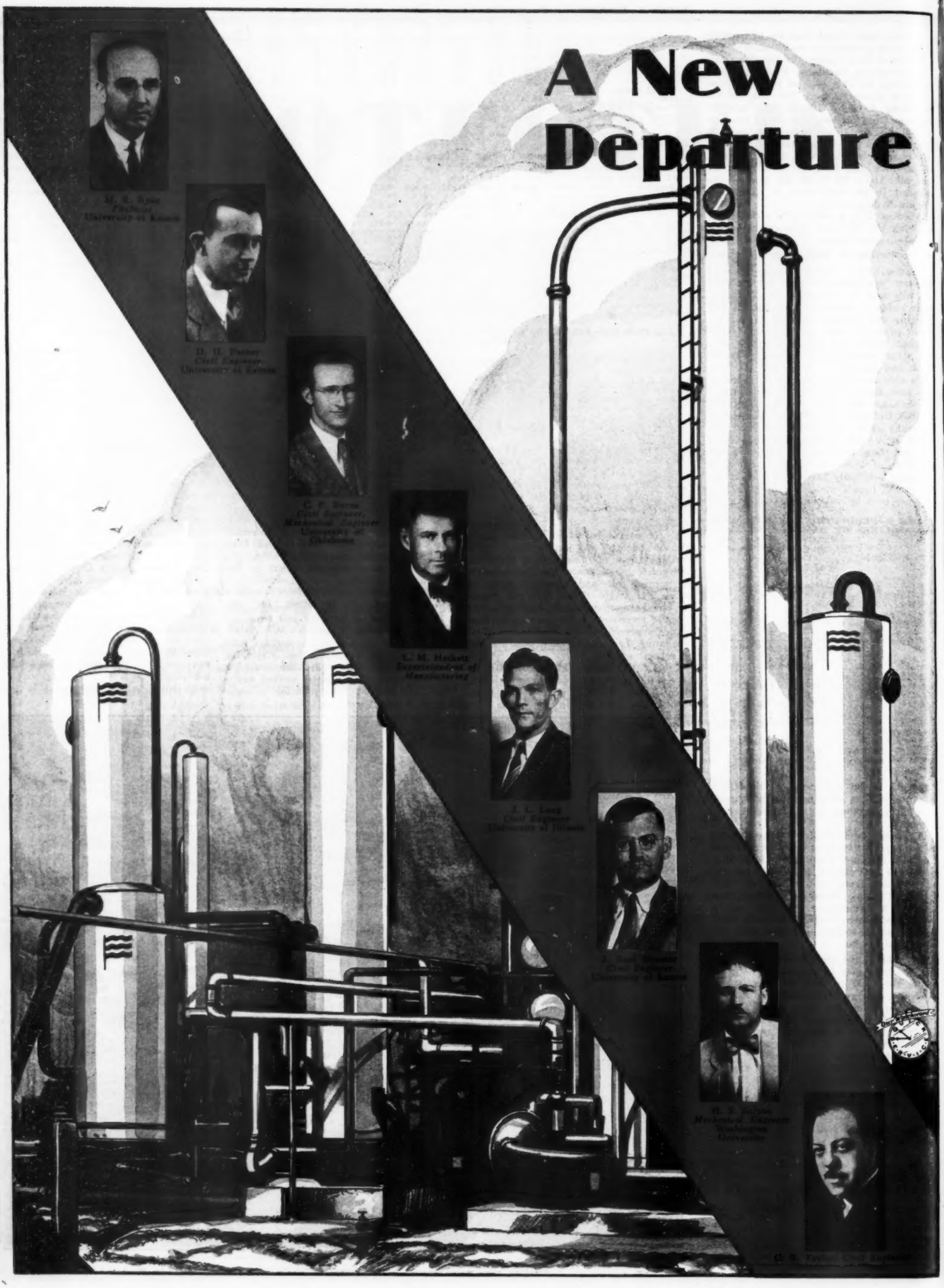
5.—Production of Stable Low-Knock Gasolines

The production of stable low-knock gasolines by hydrogenation, although carried out in the same equipment as those modifications described earlier, differs from them considerably in both aims and results. For example, in converting a fuel oil into gasoline and gas oil, or in upgrading a lubricating oil or refined oil distillate, hydrogen is added to materials naturally deficient in this respect. In other words, hydrogenation has served to saturate the hydrocarbon molecule and to render it more paraffinic. By suitably changing the operating conditions, but still utilizing the same equipment, the process may be reversed to yield stable, but nonparaffinic products. Thus, in one run on the hydrogenation pilot plant at Baton Rouge, using a Mid-Continent gas oil as charging stock, the first product made was a paraffinic burning oil of high gravity; without stopping operation, and merely by changing the conditions, the same charging stock yielded over 85 per cent of a stable, low-sulphur gasoline having the same knocking tendency as 72.6 per cent of iso-octane in n-heptane.

It will be recalled that in those adapta

Airplane view hydrogenation plant, Standard Oil Co. (New Jersey), Bayway, N. J.

[1]The term viscosity index used in these charts was devised by Dean and Davis, Chem. Met. Eng. Vol. 34, 618-9 (1929) and indicates the viscosity-temperature characteristics of the lubricating oil. Thus paraffinic oils such as Pennsylvania have a viscosity index of 100, and Coastal oils a viscosity index of from 0 to 20.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tions of hydrogenation described earlier the volumetric yield is 100 per cent or more. This is not the case in producing gasoline from gas oil, unless the knocking tendency is immaterial, the yield of gasoline being less than 100 per cent if antiknock quality is desired. In making antiknock gasoline by hydrogenation, however, no tar or coke are formed and only two products are obtained; namely gasoline and gas. Any material not converted into gasoline in the first pass through the system is recycled.

The gasolines produced thus far have been practically sulphur-free, pass doctor and corrosion after lye-washing and are quite gum stable; in a few cases some treating has been necessary, but this has been very small in amount.

Some results obtained by this operation using light gas oils[a] are given in Table 6, which shows the properties of both the feed stock and product. It will be noted that better knock-ratings are obtained with more favorable stocks, i.e., with less paraffinic charging stocks it is possible to obtain higher yields of gasoline of given knock-rating, or much better knock ratings for a given yield.

The following table shows quite strikingly this influence of character of charging stock on knocking tendency of the gasoline produced. Thus:

TABLE 7—INFLUENCE OF CHARACTER OF FEED STOCK ON KNOCKING TENDENCY OF HYDROGENATED GASOLINES

Gasoline yield	89.9	91.4	88.0	89.0
Aniline point of charge stock	161	139	102	79
General characteristics of charge—	Highly paraffinic	Medium paraffinic	Medium aromatic	Highly aromatic
Knock rating as per cent iso-octane in n-heptane	72.6	75.3	85.0	86.2

The potential value of these highly antiknock gasolines as blending agents is readily apparent, and many interesting combinations with cracking have been developed by experimentation, e.g., hydrogenation of cycle gas oils, to (a) increase gasoline yield (b) decrease refinery fuel oil production and (c) markedly better the knocking characteristics of the refiners' entire gasoline output.

The application of this phase of the hydrogenation process would appear to be wide, particularly as the need for low-sulphur, good knock-rating, stable gasoline becomes even more pronounced.

Conclusions

Consideration of the above illustrations leads to the following generalizations regarding hydrogenation:

1. The type of hydrogenation employed in treating petroleum oils differs materially in all the major aspects from hydrogenation of the Sabatier type in that (a) hydrogen at high pressure is used, (b) the hydrogen is relatively impure and contains hydrogen sulphide, (c) the catalysts are sulphur resistant, and (d) relatively higher temperatures are employed.

2. Long time runs of 6 to 8 months on commercial apparatus at high temperature may be made without coke or tar formation. The 90 per cent point or the final boiling point of the product throughout the run may be less than that of the charging stock.

3. Sulphur, an ever mounting problem in the oil industry, is readily eliminated. This holds true for all the forms of sulphur formed in a wide variety of crudes. In a recent vapor phase operation on a unit producing over 2,500 bbls. of product per day the sulphur content was reduced from 0.708 per cent to under 0.01 per cent, or an elimination of over 98.5 per cent. In general it may be said that when operating in liquid phase the elimination will be 60 to 75 per cent and in vapor phase from 80 to 99 per cent.

4. Asphaltic residues of all sorts from reduced natural crudes to cracking coil tar can be converted to distillate products free from asphalt and low in sulphur with volumetric yields in excess of 100 per cent. The hydrogenation process, therefore, offers the oil industry (a) a means of confining its production of heavy fuel to its economic market demand, and (b) a means of balancing crude production against the demand for refined white products, gasoline, Diesel

(Continued on Page 242)

[a] This adaptation of hydrogenation has thus far been applied mainly on gas oils having final boiling points of 650° F. or under although some stocks with 40 per cent or more boiling above this temperature have been found susceptible to this type of treatment. An investigation is now in progress to determine quantatively the influence of endpoint and boiling range on the results obtained.

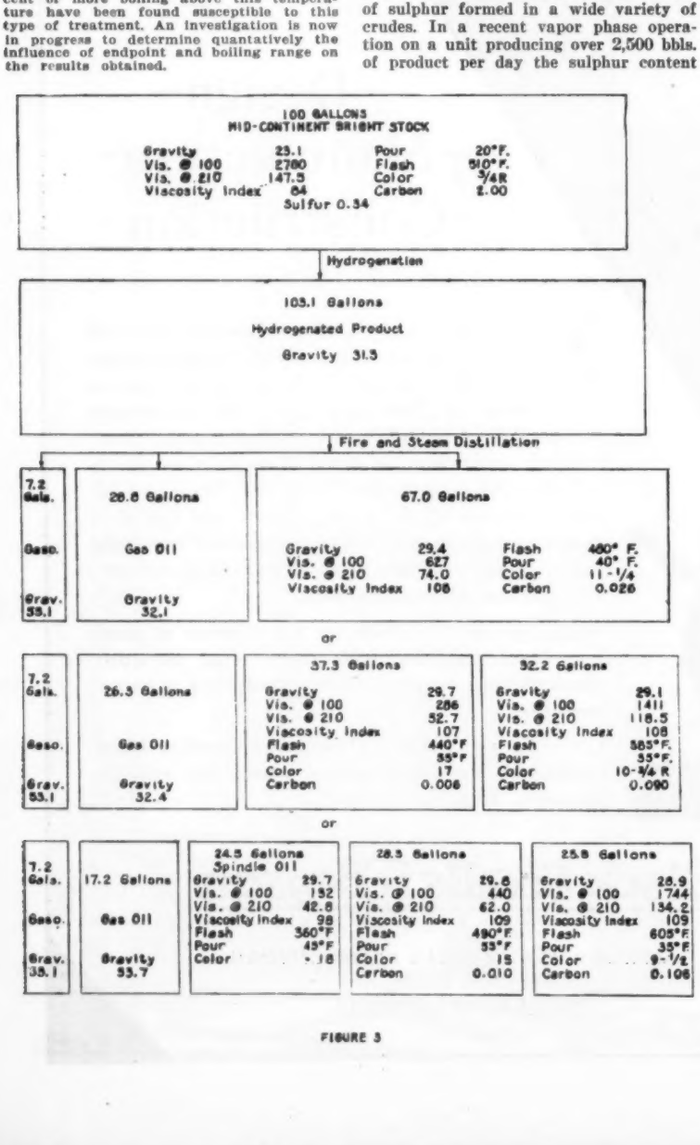


FIGURE 3

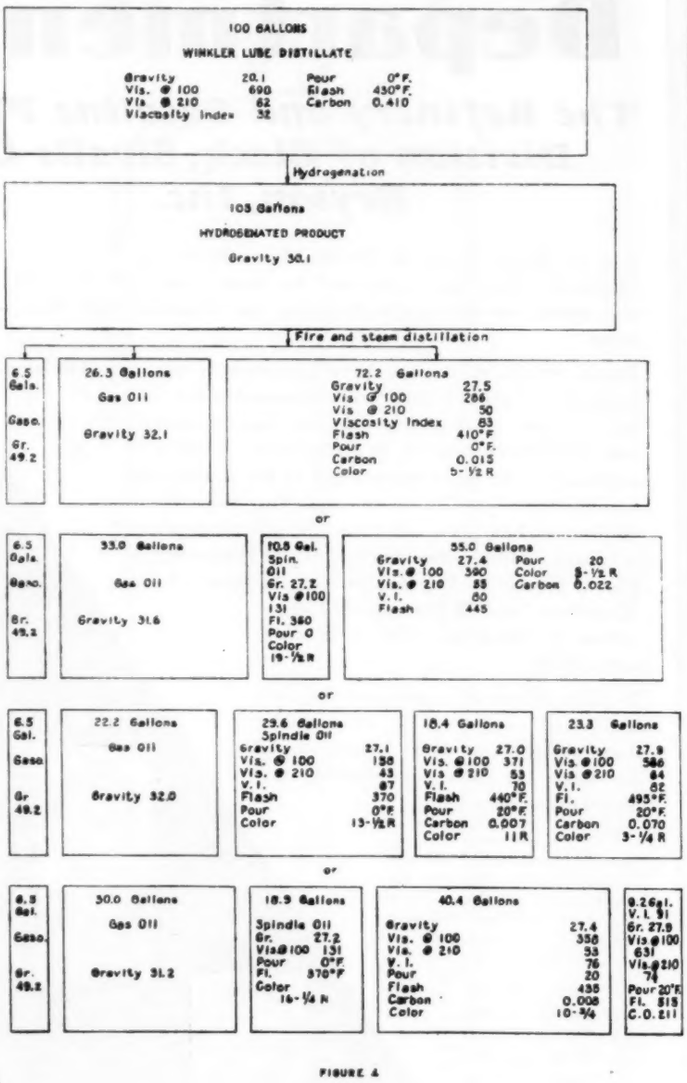
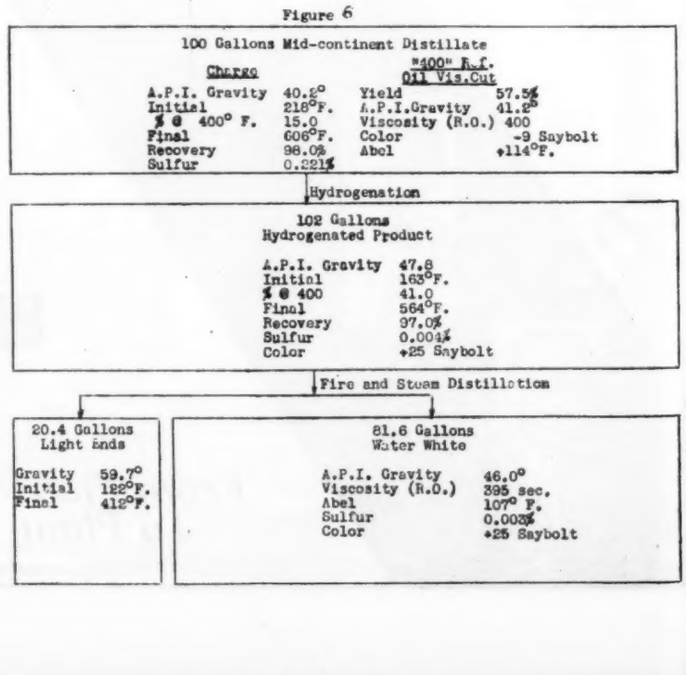


FIGURE 4

Figure 6



Increasing Ultimate Recovery of Oil

Effect of Back Pressure and Viscosity Explained. Enlargement of Filtering Area Through Sand Suggested

By S. F. Shaw
Consulting Engineer, Carter Oil Co., Tulsa*

The theory that maintaining a high back pressure on the oil sand lowers the viscosity of the oil has been generally accepted. The theory has also been advanced that lower viscosity permits the oil to be moved through the sand to the well at an expenditure of less gas per barrel of oil than would otherwise be required. It seems reasonable to assume that production of oil at the minimum gas-oil ratio will result in a greater ultimate recovery of oil.

During the past five years the writer has acquired data on thousands of tests made on wells to determine the best rate at which to produce them. In the majority of cases reduction in back pressure did not definitely increase the gas-oil ratio. The information obtained from these tests has raised doubt in the mind of the writer as to the correctness of the theory that lowered viscosity results in lower gas-oil ratios and in higher ultimate recovery of oil. The reasons that explain the results obtained in these tests cannot yet be definitely stated, but the hypothesis is being tentatively assumed that there are other factors which outweigh the influence of viscosity.

The general opinion is that in most cases it is the energy in the gas that moves the oil to the well. In wells flowing naturally it is also the energy in the gas that lifts the oil to the surface. In a flowing well, there are two very distinct operations:

1. Moving the oil through the sand to the well.
2. Lifting the oil to the surface.

The more important function of the gas is that of moving the oil to the well. Means for lifting the oil can always be found once it has been delivered to the well.

Principles Involved in Lifting Oil

A well that flows naturally is the same as a gas lift well except that all of the gas is supplied by the oil reservoir. This natural flow is subject to the same physical laws and principles that govern artificial air-lift or gas-lift flow. In all gas-lift operations there are four significant capacities for any pipe through which the mixture of oil and gas is flowed. These capacities are:[1]

1. Point of no flow caused by deficiency of gas.
2. Point of maximum efficiency.
3. Point of maximum capacity.
4. Point of no flow caused by excess of gas.

Figure 1 illustrates these conditions. There will be no flow of liquid in the pipe until the quantity of gas at point A is

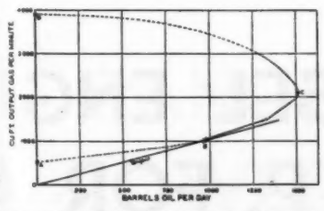


Figure 1—Relation between output gas and oil lifted

exceeded, after which the flow starts and increases regularly until point C is reached. The flow then begins to diminish and is finally reduced to zero at point D. Point B, the rate of highest lifting efficiency, is located on the curve where a straight line drawn from the origin of co-ordinates is tangent to the curve. The point of maximum lifting efficiency is reached before the point of maximum capacity is reached.

It has been stated that a velocity of 14 feet per second is required to sustain in an air current a drop of water 1 mm. in diameter.[2] If this is an exact determination, there will be required a velocity greater than 14 feet per second actually to lift the liquid. The required minimum velocity to lift a liquid will depend on the character of the liquid, on the diameter of the drops of liquid and on the density of the gas.

Effect of Differential Pressure on Rate of Flow Into Well

In large wells just completed, usually the production of oil and gas is greatest when the well starts flowing, or as soon as the loose sand and mud are cleaned out and the channels in the sand fully opened. The pressure in the well is at its maximum at this time, it is true, which might be interpreted to mean that lowered viscosity explains the maximum flow at this time. In making tests, however, the writer has found in many cases that reducing the pressure at the bottom of the well to a low point does not increase the gas-oil ratio. After the pressure is lowered below a certain critical differential, there will cease to be an increase in production of oil; yet the gas does not materially increase in volume, consequently it does not appear that increased viscosity, resulting from this lowered pressure, has had any appreciable effect on the flow into the well. The reason that no increase of oil is made after this critical differential is reached probably is that the maximum filtering effect has been reached with the given set of conditions of rock pressure, porosity, velocity, viscosity, shape of sand grain, surface exposed to the borehole and perhaps several other factors at this time unknown to us.

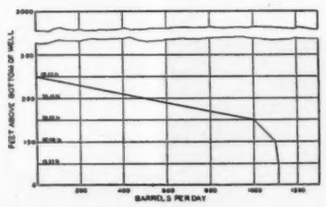


Figure 2—Relation between bottom hole pressure and capacity.

In a paper presented before the American Petroleum Institute[3] data were given on back pressures as affecting the flow of oil into the well. The explanation was advanced that the oil and gas are caused to flow into the well by a differential pressure set up between the oil reservoir and the well, and that the flow of oil and gas would increase as the pressure at the bottom of the well is lowered until the critical differential pressure is reached, after which there would be no further increase in the flow even though there were further increase in the differential pressure. The rate of increase in the flow of oil does not continue in proportion with the reduction of pressure at the bottom of the well. Data in Table 1 will serve as an illustration. These relations are illustrated in Figure 2.

TABLE 1—PRODUCTION OBTAINED BY CHANGES IN BACK PRESSURE AT BOTTOM OF WELL

Pressure at bottom, lbs.	Fluid level, ft.	Oil production, bbls. per day
97.65	250	0
78.12	200	500
58.59	150	1,000
39.06	100	1,100
19.53	50	1,110
0.0	0	1,110

With the possible exception of wells having a large excess of gas, the total increase of gas that accompanies an increase in production of oil when lifted at the best rate seems to be proportional to the increase in oil; that is, there appears to be no appreciable change in the gas-oil ratio. In areas where there is insufficient gas to lift all of the oil that would flow into the well, the writer has found that, in most cases, a change from natural flow to artificial flow by means of gas lift would maintain as low a gas-oil ratio as previously, or would even result in a reduction in the gas-oil ratio.

The gas, from which the gas-oil ratio is computed, consists of methane, ethane, propane and the heavier gasoline vapors. Because of the greater stripping effect of the heavier gasoline vapors caused by using dry gas in gas-lift operations, gas-oil ratios obtained in gas-lift operations may appear to be higher than those obtained by natural flow or on the pump. This may be only an apparent increase, however.

Tests have been made which show that in lifting oil with dry gas in the Seminole Field the gravity of the oil is reduced from about 41° Be. to a gravity as low as 37° Be. The gravity of the oil will be lowered to a greater extent in small wells on gas lift than in larger wells, because the gas-lift factor is higher in small wells than in large wells, which results in an increased stripping effect. Table 2 covers a range of production from 93 bbls. per day to 4,176 bbls. per day. These tests were conducted so as to obtain the maximum production, and after the maximum production was reached an additional quantity of dry input gas was admitted until a definite reduction in production was obtained.

If an air jet were placed in a vessel of oil and the oil were agitated thoroughly for several hours by the jet, there would be considerable extraction of gas or gasoline vapors from the oil, and the degree of extraction of these vapors would vary according to the violence of the agitation and the length of time that the oil was agitated. Somewhat similar to this action is the stripping effect caused by using large quantities of dry gas in gas-lift operations (Table 3).

[1]P. Lenard: Ueber Regen. Meteorologische Ztsch. (1904) 21, 249-262.

[2]S. F. Shaw: Well Back Pressure and Fluid Levels. The Oil and Gas Journal (November 22, 1928) 27, 50.

TABLE 2—GAS-OIL RATIOS OBTAINED FOR DIFFERENT RATES OF PRODUCTION

Well number and lease—	Maximum production, bbls. per day	Gas per bbl., cu. ft. Total output	Gas per bbl., cu. ft. Natural gas-oil ratio	Production with gas lift, bbls. per day	Gas per bbl., cu. ft. Total output	Gas per bbl., cu. ft. Gas-oil ratio with gas lift
3 Jones	93	12,360	990	79	19,630	1,280
1 S. Walker	96	14,150	2,550	82	18,000	2,970
1 Jackson	103	10,150	2,010	94	11,500	2,300
10 Wise	103	12,010	3,830	78	17,850	4,200
1 S. Walker	110	13,120	2,030	88	18,070	2,820
1 Jones	158	9,900	1,250	140	14,130	1,630
2 Jones	162	9,620	1,170	43	51,700	3,200
8 Wise	170	9,575	3,300	162	11,700	3,500
9 Wise	210	9,220	2,600	201	10,290	3,030
1 Bowlegs	240	6,300	850	223	8,530	990
12 Killingsworth	292	5,760	1,070	278	8,050	1,330
4 J. Larney	337	4,880	1,735	325	5,630	1,955
3 Thomas	346	4,115	895	346	4,775	1,075
1 Strothers	385	5,600	1,150	320	9,700	1,610
4 J. Larney	443	3,410	1,200	418	4,010	1,310
2 J. Larney	500	3,920	1,000	500	4,280	1,170
2 Melisse	560	2,587	812	477	4,570	1,115
3 J. Larney	562	3,150	710	562	3,340	835
1 Melisse	570	2,120	767	544	2,960	838
3 Fuswa	586	2,280	597	417	4,110	615
2 Melisse	594	3,162	852	570	3,942	976
2 Melisse	617	2,770	797	572	3,950	1,050
5 Frazier	648	3,047	1,435	598	3,742	1,504
6 James	685	2,470	705	550	2,460	765
1 Strothers	722	2,880	1,323	696	4,046	1,427
1 Melisse	740	2,642	710	716	3,900	925
5 Frazier	765	2,947	1,341	746	3,315	1,413
1 McMan	840	2,620	740	770	3,500	830
6 James	864	2,300	595	756	3,153	694
1 Coker	886	1,830	450	833	2,142	527
1 Killingsworth	888	3,007	2,122	744	5,000	2,303
6 James	888	2,077	604	805	2,693	733
11 Killingsworth	895	2,836	1,800	829	4,035	1,975
1 Strothers	896	2,391	987	230	2,961	1,009
2 Coker	1,025	1,402	482	780	2,770	530
10 Killingsworth	1,080	2,790	1,080	1,034	3,528	1,188
10 Killingsworth	1,126	2,700	934	1,101	3,206	1,003
2 Coker	1,224	1,477	334	1,220	1,656	433
1 Gilliam	1,417	1,272	434	1,404	1,557	573
2 Coker	1,433	1,511	405	1,422	1,608	481
3 J. Walker	1,530	1,650	520	1,510	1,992	556
1 C. Harjo	2,332	1,400	578	2,303	1,680	718
1 Wrightsman	4,176	1,218	792	3,960	1,393	832

TABLE 3—STRIPPING EFFECT CAUSED BY INCREASING QUANTITY OF INPUT GAS

Oil production bbls. per day	Total gas per minute, cu. ft. Input	Out-put	From sand	Gas per barrel oil, cu. ft. Input	Out-put	Gas-oil ratio
826	830	1,273	443	1,445	2,217	772
826	1,055	1,539	484	1,837	2,680	843
826	1,285	1,819	533	2,240	3,167	927

There was no increase in the oil production, therefore there should have been no appreciable change in the back pressure at the bottom of the well; nevertheless, the gas-oil ratio apparently continued to increase with the increased quantity of input gas per barrel of oil.

Effect of Back Pressures on Gas-Oil Ratios

The use of back pressures has been shown to have the opposite effect to that of stripping the oil, in that considerable quantities of gas and gasoline vapors are left in the oil and therefore are not measured. The example in Table 4 illustrates the effect of using back pressures on wells in the Santa Fe Springs Field, California.[4]

Table 4 indicates that when oil and gas are separated under back-pressure considerable quantities of gas accompany the oil to the secondary separator, and the higher back-pressures allow the greater quantities of gas to be carried along with the oil. In the second case cited in the table, the gas that was car-

(Continued on Next Page)

*Before Tulsa meeting, petroleum division, A.I.M.E., October 2, 1930. Copyright, 1930, by A.I.M.E., Inc.

[1]S. F. Shaw: Some Observations on Principles Involved in Flowing Oil Wells. Trans. A.I.M.E., Petroleum Development and Technology (1930) 220.

[4]C. V. Taylor: Modern Gas Trap Installation. Paper read before the California Natural Gas Association, February, 1929.

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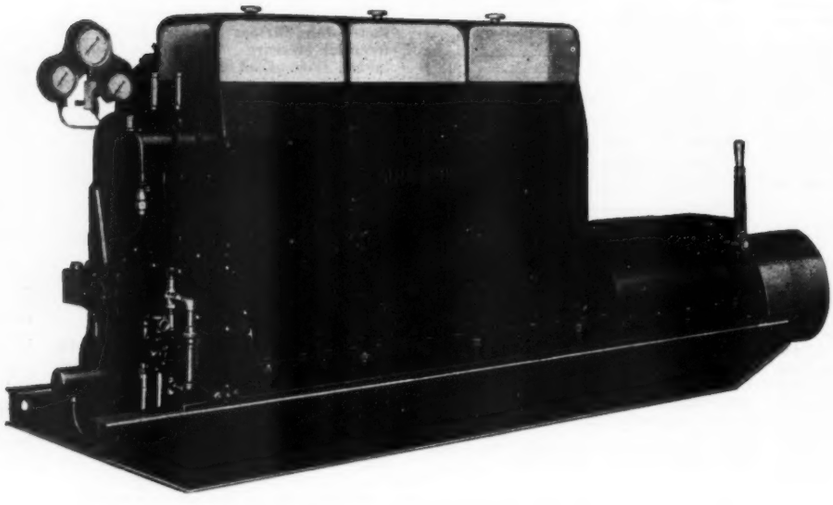

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FOR CABLE TOOL DRILLING

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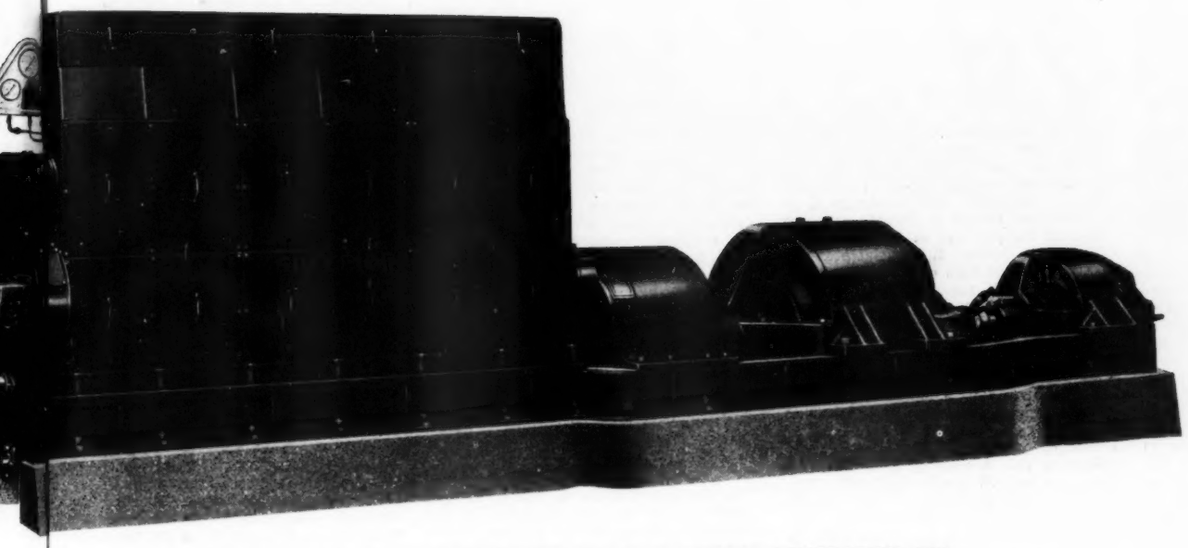

SUPERIOR TYPE VDM—6 CYLINDER 210 H. P. DIESEL GENERATOR SET
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ried out with the oil to the secondary separator amounted to an increase of 44 per cent of that measured in the first separator. Also, the percentage of discrepancy appears to become greater as the gas-oil ratios decrease. Where back-pressures are employed inspection of the tank batteries usually reveals a considerable quantity of gas escaping with the oil.

Action in Wells With Large Excess Gas

In wells where there is a large excess of gas over that required to lift the maximum quantity of oil, gas-oil ratios have been regulated or reduced, in some cases by the use of beans. It has appeared to the writer, however, that such instances usually accompany the use of tubing that is not the best size for the best rate of production. An instance may be cited in a well 3,256 feet deep with 6⅝-inch casing and 3,246 feet of 3-inch tubing, from which the data of Table 5 were obtained.

It will be noted that the flow through the annular space between the 6⅝-inch and the 3-inch tubings resulted in higher gas-oil ratios for a production of 174 bbls. per day with trap pressure of 200 pounds than the flow through the 3-inch tubing. However, when the trap pressure was lowered to 50 pounds, the production increased to 443 bbls. per day and the gas-oil ratio was reduced to a figure much below the best rate possible to obtain when flowing through the 3-inch tubing.

Instances similar to the example noted in Table 5 may be given of wells flowing naturally that were afterward changed to gas-lift operation. The results in regard to gas-oil ratios are given in Table 6.

Instances may be cited, as in Table 7, which indicate that gas-oil ratios were not materially affected by reducing the back-pressure in wells flowing naturally.

The increases or reductions in the gas-oil ratios shown in Table 7 are too small to admit the conclusion that there was any actual change in gas-oil ratios when we consider the possibilities of error in reading orifice meters and the tendencies for gas to escape without being measured.

When due precautions are observed as to the use of the best size of tubing, and corrections are made to obtain the actual gas-oil ratios under equivalent standard conditions, it may be found that, even in wells with large excess of gas, the use of back-pressures at the casinghead may not secure the lowest gas-oil ratios. If, then, it should be found that lower gas-oil ratios are not obtained by holding back-pressures either in gas-lift wells or in wells flowing naturally, the theory as to the use of higher back-pressures to obtain lower viscosity fails, so far as being a critical factor in ultimate recovery.

Velocities of Flow Through Oil Sands

It will be interesting to examine the effect of underground velocities. We will take the case of a well with sand thickness of 25 feet, pore openings at the well at per cent, diameter at the bottom of the well of 6 inches; flow into the well of 1,000 cubic feet of gas per minute, or 1,440,000 cubic feet per day under bottom-hole pressure of 130 pounds, with 1,000 bbls. of oil per day. Under these conditions the velocity at the entrance to the well would be 0.55 foot per second. At 10 feet from the well the velocity would be 0.014 foot per second, and at 100 feet distance the velocity would be 0.0014 foot per second. With bottom-hole pressure at the well of 130 pounds, the rock pressure at 100 feet distance from the well would be considerably greater than 130 pounds and the velocity would be correspondingly reduced. If the production were 5,000 bbls. per day, accompanied by 5,000,000 cubic feet of gas, and the bottom-hole pressure were 300 pounds, the velocity at entrance to the wells with the same assumed sand thickness would be 0.95 foot per second. The pore openings at the periphery of most wells probably is several times that assumed above, therefore velocities are usually much lower than in the cases assumed.

With the low velocities noted, there may be a tendency for the gas to escape from the oil without moving the oil through the sand. At any rate it may be that such velocities are so low as to be very inefficient and any increase in velocity that is practicable to obtain up to the maximum flow conditions may tend toward a large increase in the efficiency of the flow. This condition of increased velocity can be brought about by lowering the pressure at the well to the point of the critical differential pressure.

Attention has been called previously to the fact that if the velocity is too low, perhaps under 14 feet per second, no liquid will be lifted in gas-lift work through long pipes, because the gas will separate from the oil and will escape without serving any useful purpose. If we attempt to flow a mixture of oil and gas through a horizontal flow line, we find that the efficiency is very low. If a number of obstructions or bends are placed in this horizontal flow line, the efficiency is still further reduced. This condition of inefficiency will finally reach a point at which the flow will cease entirely and the gas will stratify and flow above the oil, unless greater pressure condition is set up to overcome these obstructions.

It is true that the flow through the sand is not exactly analogous to the lifting of oil in a vertical pipe, but in somewhat similar manner to the flow through a horizontal pipe, the flow through an oil sand must be at low efficiency when computed on a foot-pound energy basis.

Fluctuations in Velocity

After the oil close to the well has been removed, the oil at a greater distance must be propelled to the well through a distance that becomes increasingly greater and this must be done at an increasing expenditure of energy. The velocity of flow increases as the moving mixture of oil and gas approaches the well; conversely, the velocity gradually becomes reduced as the distance from the well increases. The problem of moving oil into the well is affected not so much by excessive velocities close to the well as by a velocity at a distance from the well that is too low to move the oil through the winding channels of the sand. The movement is so slow that the gas tends to escape from the oil without moving the oil toward the well. The low velocity at a distance from the well, coupled with the increasing distance that the oil must be moved through the sand, gradually reduces the quantity of oil that eventually will reach the well.

Another basis on which the propulsion of oil through the sand might be considered is that of the energy released by the gas during the flow to the well. A perfect gas in expanding isothermally to atmospheric pressure (14.7 pound per square inch absolute at sea level) develops a definite number of foot-pounds of work, as noted in Table 8.

TABLE 8—FOOT POUNDS OF WORK DEVELOPED WHEN A PERFECT GAS EXPANDS ISOTHERMALLY TO ATMOSPHERIC PRESSURE OF 14.7 POUNDS ABSOLUTE

Gauge pressure lbs. per sq. in.	Foot pounds work developed	Gauge pressure, lbs. per sq. in.	Foot pounds work developed
1,000	8,964	500	7,527
900	8,744	400	7,069
800	8,499	300	6,486
700	8,222	200	5,676
600	7,902	100	4,349

In flowing through the sand, the gas expands from the rock pressure to the pressure existing at the bottom of the well, and the maximum amount of energy available for propulsion of oil is the difference in foot-pounds existing at these respective pressures. Thus, if the rock pressure is 1,000 pounds, and a back-pressure is held such that the pressure at the bottom of the well is 600 pounds, the maximum energy that can be developed is the difference between 8,964 and 7,902 foot-pounds, or 1,062 foot-pounds. If the pressure at the bottom of the well is reduced to 200 pounds the energy available for propulsion of the oil is 3,288 foot-pounds. The reduction of pressure at the bottom of the well from 600 to 200 pounds would, therefore, increase to three times the energy available for moving oil through the sand.

Some of the gases associated with the oil are liquids when the pressure is high and are not available as a source of energy until the pressure is reduced enough so that they can assume the gaseous state. When in a liquid state these gases require the use of other fixed gases to propel them through the sand.

Reduction of Back-Pressure

Reduction of back-pressure at the top of the well has the effect of reducing the back-pressure at the bottom of the well to some practicable limit and increases the energy available in the gas for moving the oil through the sand. Moreover, removal of the back-pressure at the top of the well increases the energy in the gas available for lifting the oil from the bottom to the top of the well. The question that remains to be answered is whether this energy can be applied more efficiently in one case than in the other. The deductions from thousands of tests supervised by the writer is that the energy is more efficiently applied when employing low back pressures than when employing high back pressures.

Once a given well spacing has been adopted, the distance that the oil must be moved and the number of obstructions in the path of the oil cannot be changed, but the velocity can be controlled to some extent by reducing the flowing pressure at the well to the critical point, especially if this is done while the pressure in the sand is still high.

We are puzzled, at times, to understand why a producing well that has been closed for a time shows a loss of production when reopened. It seems possible that a readjustment of pressures takes place between the saturated oil sand and the area immediately surounding the well after the well has been shut in. In this readjustment the gas escapes so slowly from the saturated portion of the sand that the velocity is not sufficient to move the oil toward the well. This movement of gas will continue, however, until pressure equilibrium is established, even though there may be no movement of the oil.

The theory has been advanced[5] that enlarging a well where it penetrates the oil sand will be productive of good results. The writer is of the opinion that the enlargement of the diameter of the well at the bottom would be far more beneficial in increasing the ultimate recovery than the use of back-pressures. Shooting wells has the effect of enlarging the hole, and has given satisfactory results in the Mid-Continent Field. Observations made on several wells in the Seminole area indicated that the gas-oil ratio was lowered when production was increased by shooting the wells. Examples of reducing gas-oil ratios by shooting are given in Table 9.

TABLE 9—EFFECT ON GAS-OIL RATIOS PRODUCED BY SHOOTING WELLS

Well—	Oil production, bbls. per day Before shooting	Oil production, bbls. per day After shooting	Gas-oil ratios Before shooting	Gas-oil ratios After shooting
A	335	677	1,320	853
B	454	671	850	675
C	368	606	1,290	881
D	382	854	1,923	1,518
E	687	602	1,264	1,530
F	788	1,475	600	444
G	395	724	973	698
H	732	1,969	548	654
I	171	279	970	900
J	181	238	2,250	2,450
K	206	497	2,580	1,591

In nearly every case there was a reduction in the gas-oil ratio after shooting the wells. In the cases where there was no reduction in the gas-oil ratios, the tests were made at intervals too far apart, before and after the shooting, to give a fair comparison.

Conclusions

1. The laws governing the filtering effect of mixtures of oil and gas in passing through a porous sand medium probably have far greater effect on production of oil, under the various conditions that exist in the sand, than the single factor of viscosity as influenced by back-pressures. In other words, viscosity is only one factor under existing underground conditions, and probably is a relatively unimportant factor.

2. The explanation suggested by the writer is that while a high back-pressure may reduce the viscosity of the oil, it tends to reduce the velocity of flow through the sand to a point where the moving gas will not carry with it the maximum load of oil. In other words, the available energy in the gas is not utilized to maximum advantage.

3. The method of production tentatively suggested for obtaining the maximum ultimate recovery of oil is to enlarge the filtering area through the oil sand at the bottom of the well as much as practicable and to reduce back-pressures at the sand to the critical differential pressure.

[5] L. C. Uren: Increasing Production of Petroleum by Increasing Diameter of Wells. Trans. A.I.M.E. (1925) 71, 1,276.

TABLE 4—EFFECT OF BACK PRESSURES ON GAS-OIL RATIOS

Oil production, bbl. per 24 hrs.	Total gas-oil ratio, cu. ft. per bbl.	Primary trap data: Temperature, °F.	Primary trap data: Pressure, lb. per sq. in.	Primary trap data: Gas-oil ratio, cu. ft. per bbl.	Secondary trap data: Temperature, °F.	Secondary trap data: Pressure lb. per sq.in.	Secondary trap data: Dissolved and entrained gas in oil, cu.ft. per bbl.
5,155	2,819	128	300	2,576	96	16	243
4,067	1,256	132	300	869	109	16	387
4,175	1,518	131	300	1,241	112	8	277
5,826	4,430	123	300	4,090	104	14	340
2,622	3,775	125	200	3,640	95	7	135
3,326	3,165	122	200	2,980	92	9	175

TABLE 5—EFFECT ON GAS-OIL RATIOS CAUSED BY INCREASING PRODUCTION

Flow tubing size, inches—	Pressure, pounds: Casing	Pressure, pounds: Trap	Oil, bbls. per day	Gas: Per minute, cu. ft.	Gas: Gas-oil ratio
3	265	132	227	1,890	11,980
3	246	99	235	1,980	12,130
3	223	46	242	2,078	12,350
Between 6⅝ and 3	(*)	200	174	1,600	13,250
	(*)	144	211	1,829	12,470
	(*)	93	228	2,040	12,870
	(*)	50	443	2,272	7,375

*No pressures were obtained on the tubing when flowing between the tubing and casing.

TABLE 6—GAS-OIL RATIOS IN WELLS FLOWING NATURALLY AND ON GAS-LIFT

Well—	Method of flowing	Depth of tubing or casing (ft.)	Oil, bbls. per day	Gas per minute, cu. ft.: Input	Gas per minute, cu. ft.: Output	Gas per minute, cu. ft.: Sand	Gas per barrel, cu. ft.: Input	Gas per barrel, cu. ft.: Output	Gas-oil ratio
A	Natural	4,340	975	...	911	911	...	1,345	1,345
A	Gas-lift	4,340	1,295	341	1,284	943	378	1,429	1,051
B	Natural	4,347	511	...	420	420	...	1,440	1,440
B	Gas-lift	4,347	1,479	978	1,882	904	952	1,832	880

TABLE 7—EFFECT ON GAS-OIL RATIOS OF LOWERING BACK-PRESSURES

Well—	Length tubing, ft.	Diameter of bean, in.	Pressure at well, lbs.	Pressure at bean, lbs.	Oil, bbls. per day	Gas-oil ratio, cu. ft. per bbl.
C	1,708	⅝	...	...	161	1,448
C	1,708	1	...	...	457	1,345
C	1,708	3	...	...	522	1,296
B	....	4-in. pipe	35	0	1,475	492
B	....	½	210	180	689	418
B	....	⅝	205	175	1,353	431
B	....	¾	200	160	1,471	479
B	....	⅞	180	128	1,612	490
D	....	1	175	105	1,709	487
D	....	⅝	200	180	573	475
E	....	¾	190	185	103½	427
E	....	¼	205	200	318	440
E	....	⅝	225	215	328	485
E	....	½	225	185	728	485

Analyzing Refinery Gases and Vapors

Laboratory Investigations Give Data Which Have Wide Application in Refining and Utilization of Products

By Walter J. Podbielniak

The term "refinery gases and vapors" as used in this article refers to all the "fixed" gases produced in the refining of petroleum regardless of source. Thus we have the fixed gas from the crude storage tanks, from the topping stills, from the gasoline stabilizing towers, from the cracking units, etc. These various gases usually total from about 2 per cent to as much as 40 per cent by weight of the crude petroleum refined, high temperature cracking processes accounting for the higher figures. The gases produced in a refinery are therefore a rather important by-product, especially since they contain considerable quantities of heavier hydrocarbons in vapor form, such as butanes, pentanes, and hexanes, which are a necessary and valuable component of any motor fuel gasoline in order to impart to it proper volatility, or ease of vaporization.

It is of considerable practical importance to be able to analyze the various gases in a refinery for their content of these heavier hydrocarbons, so that suitable vapor recovery systems may be designed and constructed for their economical recovery. The problem is here the same as that of analyzing natural or casinghead gas for its content of natural gasoline and liquefied-gas components. Fundamental analysis, i.e., analysis into individual hydrocarbon components such as methane, ethane, propane, etc., by fractional distillation, which is widely used for the design and routine control of operation of natural gasoline and liquefied-gas plants, may be used to similar advantage as an absolute guide in the design and operating control of all refinery equipment and processes which function to separate hydrocarbons for use in gasoline and other liquid products from unusable gaseous hydrocarbons.

Cracked refinery gases also usually contain considerable percentages of the unsaturated lower molecular weight hydrocarbons, ethylene, propylene and butenes. These latter are a valuable raw material for chemical by-products, and undoubtedly, the refinery of the future will be designed to extract these hydrocarbons from the gases now used up as fuel. There is again need for a practical analytical method which may be used in connection with the design and operating control of equipment to extract gaseous hydrocarbons efficiently and economically.

In this article the general composition of refinery gases will be briefly discussed; also, a modification of the fractional distillation analytical method as used for natural gas and gasoline to adapt it to complete analysis of complex cracked refinery gases and gasolines.

Composition of Refinery Gases

Refinery gases may conveniently be classified into (1) undecomposed gases and vapors, and (2) thermally decomposed vapors and gases, as from cracking processes. As will be shown, these two classes are very much different.

Undecomposed gases.—Gases of the first class are merely the vapors and evolved gases from petroleum crude or its fractions, which have not been heated up to their cracking temperature and which consist predominately of saturated paraffinic hydrocarbons, identical with those occurring in natural gas. In fact, it should be pointed out that natural gas and refinery gases are both distillates from petroleum crude, with the difference that the former is distilled from the crude while it is contained deep in the rock formations of the earth, while the latter is vaporized or distilled in refinery equipment. Both therefore consist of the same hydrocarbons of the methane series, which latter may be conveniently visualized as in Figure 1, the representations of the hydrocarbons being intended to correspond to their physical and chemical characteristics, as follows:

CHARACTERS OF HYDROCARBONS ILLUSTRATED

Figure 1—Saturated hydrocarbons in natural gas and gasoline.

Figure 2—Unsaturated hydrocarbons in cracked refinery gases.

First is Methane, with a low boiling point of —259° F., "dry" and devoid of gasoline value. Next is Ethane, boiling at —127° F.—still a "windy" sort of fellow, useless for gasoline. Propane boils at —44.0° F.—a mischievous imp, whom we would like to completely exclude from gasoline and who is chiefly responsible for the use of stabilizers. Next are the Isobutane and N-butane twins, boiling at +10.0° F. and at 30.9° F., respectively, which are useful in motor fuel up to a certain amount (N-butane is more sedate, corresponding to its higher boiling point); and lastly, there lolls back Pentanes-and-Heavier, the money-making fraction. Pentanes-and-Heavier may be further analyzed into Pentanes, Hexanes and Heptanes-and-Heavier.

The hydrocarbons mentioned above are all members of the so-called Methane series of saturated hydrocarbons. Since they are definite pure chemical compounds, we have available considerable data on their physical properties, such as specific gravity, vapor pressures, heating value, etc., which may in turn be used to interpret, and to calculate from, analyses of gases in terms of these hydrocarbons.

Refinery gases may of course contain hydrogen sulphide (and volatile mercaptans) vaporized from the crude; also oxygen and nitrogen, these latter usually coming from the atmosphere. With these exceptions no other hydrocarbons such as cyclo-propane, cycle-butane, tetramethylmethane and other theoretically possible hydrocarbons, usually occur in undecomposed refinery gases. In other words, undecomposed refinery gas, as well as natural gas are simpler in composition than might be expected from the large number of isomeric and napthenic compounds theoretically possible.

"Cracked" Gases

The various cracking processes used in petroleum refining go to extremes in pressures and temperatures and administer the roughest kind of treatment to the members of the methane series which usually predominate in petroleum. In the fierce heat of these cracking processes are formed new compounds which are picturized in Figure 2, similar to Figure 1.

Hydrogen is usually formed in quantity in all thermal decomposition of petroleum hydrocarbons. Acetylene is generated in small quantities at very high temperatures: its three horns correspond to the triple bond in its chemical formula. Ethylene and propylene are double-bond compounds, hence the double horns; the fidgety appearance of their figures indicates their high chemical reactivity. The butenes are numerous and close on the heels of each other in boiling point as well as in other physical properties; they are correspondingly difficult to separate in either plant or laboratory. Higher molecular weight (comparatively unknown) hydrocarbons of the acetylene and ethylene series are too numerous for picturization.

However, thermally decomposed gases almost always contain undecomposed saturated hydrocarbons as well as the newly found unsaturated hydrocarbons. Cracked

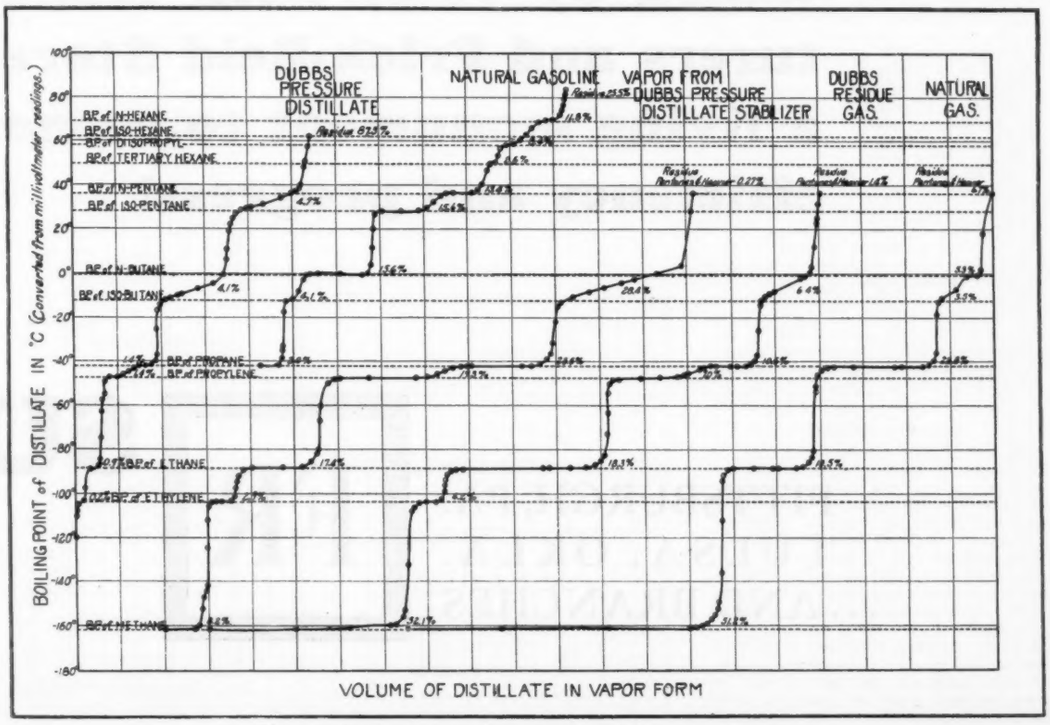

Figure 3—Fractional distillation curves of typical gases and gasoline.

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gases are therefore, from the very manner of their formation, about twice as complex in composition as natural gas or undecomposed refinery gases. They do not, however, contain anywhere near all the olefinic, acetylenic, and aromatic hydrocarbons theoretically possible of formation and existence in the gas phase.

Analytical Methods

Specific tests are not in general available for the direct determination of individual hydrocarbons in complex mixtures such as natural or refinery gas. We must therefore resort to fractional distillation analysis which takes advantage of the differences in the boiling points of hydrocarbons rather than difference in their behavior when acted upon chemically.

An apparatus for fractional distillation analysis of gaseous and volatile liquid mixtures as developed by the writer has been repeatedly described in the literature and the reader is referred to previous articles* for information on the principles and details of this apparatus and analytical method. Figure 3 shows the fractional distillation curves and analytical results secured on representative samples of various gases and gasolines.

The curves and analyses for Natural Gas and Natural Gasoline are similar to curves which are secured for undecomposed refinery gases and gasolines of Class 1. It will be noted that the constant-temperature "plateaus" on these curves, which represent pure saturated hydrocarbons, are very well delineated and separated by almost vertical rises, except in the case of the difficult separations between isobutane and n-butane and between isopentane and n-pentane. There is no essential difference between the analysis of natural gas and gasoline and that of undecomposed refinery gases and gasolines.

However, the other curves in Figure 3, representing cracked Dubbs products, show considerable differences from the first two curves mentioned. Definite additional plateaus occur corresponding to the boiling points of ethylene and propylene, respectively, while the portions of the curves corresponding to butanes-butenes and to pentanes-amylenes, respectively, show "smears" or gradual temperature rises instead of perfectly horizontal plateaus. These "smears" are, of course, due to the fact that the butanes-butenes and the pentanes-amylenes fractions each consist of five or more hydrocarbons boiling over a temperature range of less than 12° C. and hence extremely difficult to separate by even the most efficient fractionation of which the apparatus is capable. The fractions themselves of course boil comparatively far apart and are sharply differentiated.

For most purposes, such curves as shown in Figure 3 yield all the information desired, including the percentages of methane-and-lighter, ethylene, ethane, propylene, propane, butenes-butanes, pentanes-amylenes and hexanes-and-heavier. Frequently, however, it is desired to determine the unsaturated content of the various fractions more accurately than is indicated by the curve, and also to analyze further the methane-and-lighter fraction in the case when hydrogen and carbon monoxide are present as well as nitrogen and oxygen, all these latter compounds being noncondensible even at liquid air temperatures and hence vented from the fractionating column of the apparatus without fractionation.

Also acetylene and acetylenic compounds may be present in the sample, as well as other compounds not shown in Figures 1 and 2. Table 1 lists most of the known compounds with boiling points below 100° C., some of which may also enter the composition of highly cracked refinery gases.

When such complete analysis of highly complex gas or volatile liquid samples is desired, it becomes necessary to modify the analytical procedure so as to separate the sample into a minimum number of very sharply cut fractions, each fraction consisting of only a few chemically dissimilar components, which may be determined directly in the fraction by suitable specific tests, such as shown in Table 2. In this way, even a very complex sample can be completely and accurately analyzed into practically all of its individual components.

*"Fractional Distillation Analysis — Its Application in the Manufacture of Natural Gasoline and in the Refining of Petroleum," published in the Refiner and Natural Gasoline Manufacturer, March, 1929.

"Fractional Distillation Analysis," published in The Oil and Gas Journal, October 10, 1929.

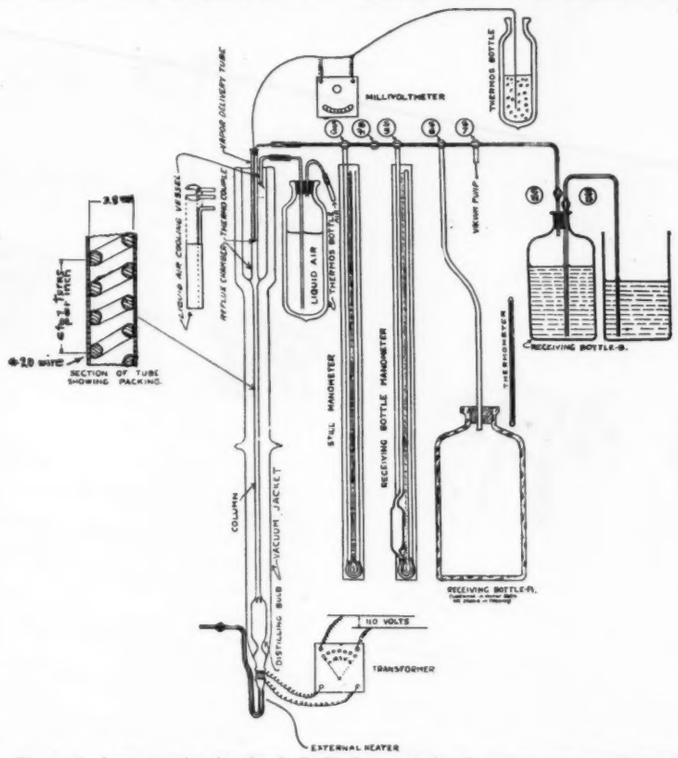


Figure 4—Apparatus for fractional distillation analysis of natural gas gasoline and similar gaseous and volatile liquid mixtures.

Procedure

The procedure to be followed for such analysis will now be outlined with reference to Figure 4, showing a diagram of the apparatus and arrangement used, and to Figure 5, showing the usual distillation curve of a Cross residue gas which, however, was also analyzed by the "fraction" method with the resulting percentages as shown in the figure.

Apparatus.—The same apparatus is used as for natural gas analysis except that a number of 1-gallon glass bottles is prepared with double outlets and stopcocks as shown in Figure 4 for Receiving Bottle B. As many bottles are made ready as there are separate fractions to be collected. Each bottle is suitably calibrated at small volume intervals, preferably by using a gummed paper strip, pasted lengthwise on the side of the bottle and paraffined after all calibration marks are made on it. The cork used to close the neck of the bottle is coated with de Khotinsky cement all over and forced into place after warming both the glass parts and the cork. Leaks are of course not permissible. Either capillary glass tubing or one-eighth inch O.D. copper tubing should be used to connect these "fraction" bottles to the stopcock manifold of the apparatus, together with shortest possible rubber tubing connections. These latter are preferably also coated with de Khotinsky cement on the inside and warmed into place to avoid absorption of hydrocarbons by the rubber. Before use, each bottle is completely filled either with plain water or with brine and a siphon connection made to a water jar as shown in the figure.

In the case of samples containing unsaturated or aromatic compounds, it is necessary to use magnesium perchlorate trihydrate as drying agent instead of phosphorous pentoxide powder. The latter if moist may absorb unsaturateds and aromatics.

There will be required a suitable Orsat type apparatus for making tests on the fractions by absorption over chemical reagents, by oxidation over cupric oxide and by slow combustion over a glowing platinum spiral. This apparatus should include caustic potash, pyrogallate (or other oxygen absorbing medium) and bromine water pipettes. In addition, there may be required special pipettes or apparatus for the specific determination of acetylene, hydrogen sulphide and sulphur compounds, naphthalene, etc.

Certain compounds would interfere with fractionation in the column of the apparatus and must be removed from the sample before it may be entered. Water and carbon dioxide would freeze and obstruct the column and are removed by a drying agent and by a caustic alkali trap, respectively. Hydrogen sulphide is also removed in the caustic alkali trap, which is fortunate, as it can be more advantageously determined separately on the original sample as in Table 2.

Acetylene may be allowed to enter the column with the rest of the gas sample, where, however, it will freeze and obstruct the column unless the column pressure be increased to about 1,200 mm. of mercury absolute. On account of the tendency of liquefied acetylene to sometimes explode spontaneously, it is perhaps preferable to remove acetylene from the sample before the latter is fractionated, by some suitable specific test. Fortunately, acetylene rarely occurs in cracked refinery gases and when it does occur it is usually found in very small percentages.

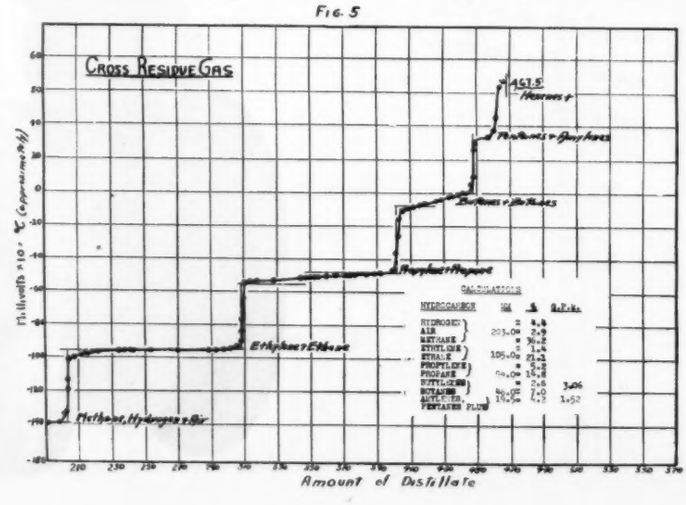
The procedure actually used in separating the sample into fractions is rather simple. The gas (or gasoline) sample is entered into the column as usual, except that any gas, which must be vented from the top of the column to relieve the column pressure is passed directly into one of the calibrated 1-gallon bottles, connected to the stopcock manifold as shown in Figure 4; stopcock 4 being used in the usual manner to control the rate of distillation. In the case of gas samples, the first fraction to be thus collected will consist of methane and all lower-boiling compounds, such as hydrogen, carbon monoxide, nitrogen and oxygen. The distillation is conducted just as carefully as possible, to obtain the very best fractionation, but it is not necessary to take temperature readings. Instead, the distillation is stopped temporarily when the reflux temperature reaches the mid-point between the boiling points of methane and ethylene, and the volume of fraction collected in the 1-gallon bottle carefully measured on the calibration strip pasted on the bottle (after, of course, equalizing water levels inside and outside the bottle in the usual manner); the bottle is then disconnected and replaced by another in readiness for the next fraction.

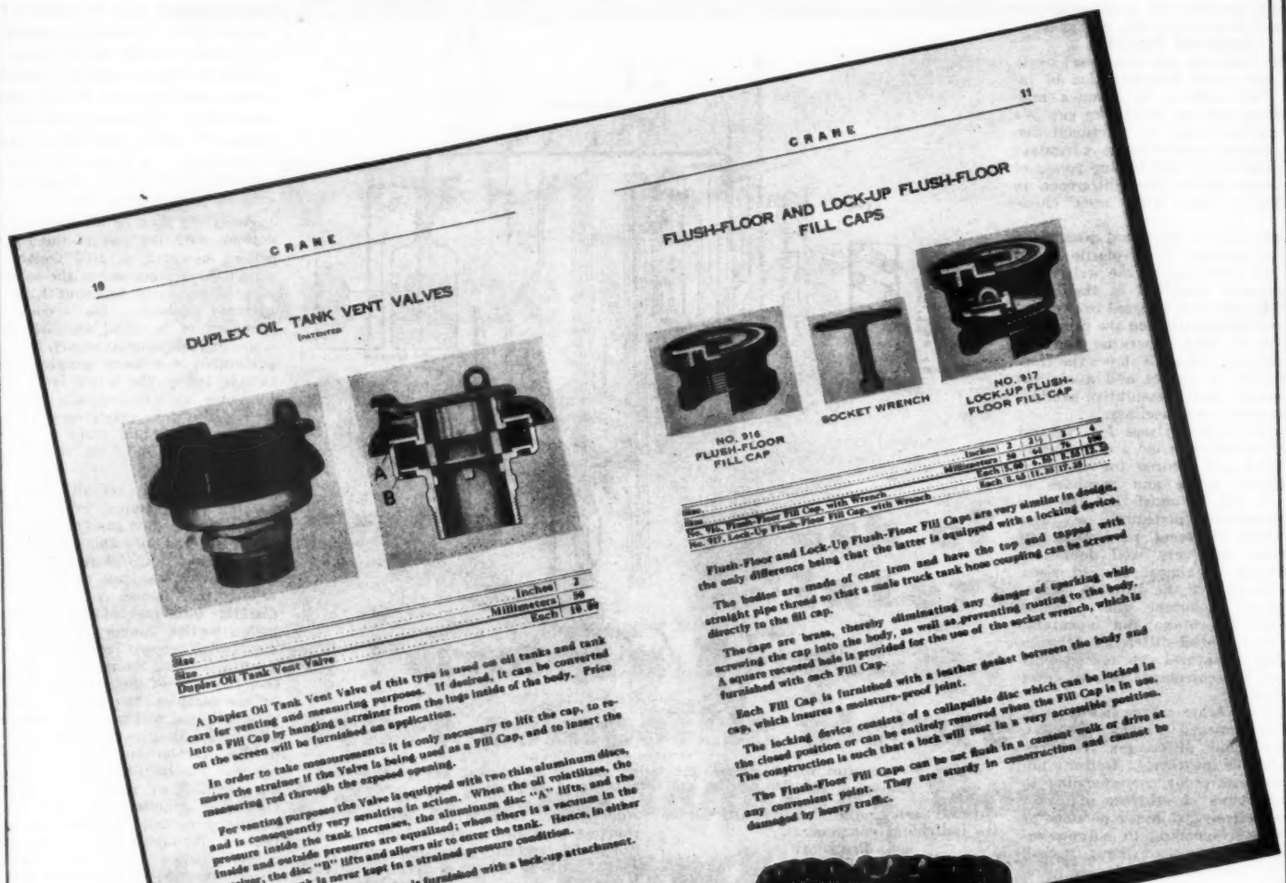
The rest of the sample will usually be broken up into the following fractions: Ethylene-ethane fraction, propylene-propane fraction and butenes-butanes fraction. These fractions will, of course, be taken between suitable temperature cut-points. It is of no avail to record temperature readings except at the cut-points since these would not in any way enter the subsequent calculations except perhaps as a check on the fractionation actually secured. However, it is very important that the analyst uses all his skill and care to secure as sharp fractionation as possible, by progressively retarding rate of distillation when near a cut-point, etc., so that the fraction collected will not be contaminated with the next fraction. The separation of methane-and-lighter from ethylene-and-heavier is, of course, very sharp, due to the large difference in boiling points.

Residue of Sample

The residue of the sample, i.e., amylenes-pentanes-and-heavier is liquid at room temperature and cannot very conveniently be collected otherwise than in the usual manner, namely by distilling into an evacuated bottle or known volume, the amount of this fraction being computed from the capacity of the bottle, vapor temperature, vapor composition (as determined from its boiling point curve) and change in pressure in the bottle due to entering the vapor distillate. It is obviously necessary to convert the volume of this fraction into the same units as those in which the other fractions were measured, namely cubic centimeters of vapor at room temperature, over water and at atmospheric pressure. This may

FIG. 5





10 CRANE

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Size	Inches	2
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Duplex Oil Tank Vent Valve	Each	10 00

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In order to take measurements it is only necessary to lift the cap, to remove the strainer if the Valve is being used as a Fill Cap, and to insert the measuring rod through the exposed opening.

For venting purposes the Valve is equipped with two thin aluminum discs, and is consequently very sensitive in action. When the oil volatilizes, the pressure inside the tank increases, the aluminum disc "A" lifts, and the inside and outside pressures are equalized; when there is a vacuum in the receiver, the disc "B" lifts and allows air to enter the tank. Hence, in either case the oil tank is never kept in a strained pressure condition.

For added protection the Valve is furnished with a lock-up attachment.

11 CRANE

FLUSH-FLOOR AND LOCK-UP FLUSH-FLOOR FILL CAPS

NO. 916 FLUSH-FLOOR FILL CAP

SOCKET WRENCH

NO. 917 LOCK-UP FLUSH-FLOOR FILL CAP

Size		Inches	2	2½	3	4
		Millimeters	50	64	75	100
No. 916, Flush-Floor Fill Cap, with Wrench		Each	6 00	6 50	8 00	15 00
No. 917, Lock-Up Flush-Floor Fill Cap, with Wrench		Each	8 50	11 50	17 50	

Flush-Floor and Lock-Up Flush-Floor Fill Caps are very similar in design, the only difference being that the latter is equipped with a locking device.

The bodies are made of cast iron and have the top and tapped with straight pipe thread so that a male truck tank hose coupling can be screwed directly to the fill cap.

The caps are brass, thereby eliminating any danger of sparking while screwing the cap into the body, as well as preventing rusting to the body. A square recessed hole is provided for the use of the socket wrench, which is furnished with each Fill Cap.

Each Fill Cap is furnished with a leather gasket between the body and cap, which insures a moisture-proof joint.

The locking device consists of a collapsible disc which can be locked in the closed position or can be entirely removed when the Fill Cap is in use. The construction is such that a lock will rest in a very accessible position.

The Flush-Floor Fill Caps can be set flush in a cement walk or drive at any convenient point. They are sturdy in construction and cannot be damaged by heavy traffic.

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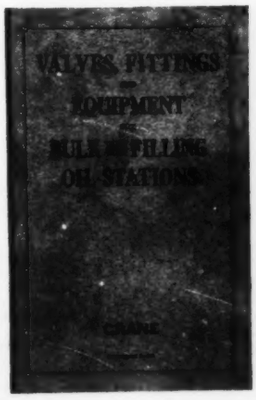

If any of your problems deal with planning or operating bulk and filling oil stations, a copy of this book belongs on your desk

be done by use of the following conversion formula:

$$\text{Mm. rise of mercury on closed-arm of receiving bottle manometer} \times \frac{KH}{P_a - V.T._r} = \text{Cc. of vapor at room temperature, at atmospheric pressure and saturated with water vapor}$$

in which

K = Calibration constant of receiving bottle manometer to convert rise of mercury in closed arm to actual change in pressure.
H = Volumetric capacity of receiving bottle A in cc.
P_a = Atmospheric pressure in mm. of mercury.
$V.T._r$ = Vapor tension of water at room temperature in mm. of mercury.

The volumes of all the fractions may now be added up and their relative percentages in the original sample calculated by dividing the volume of each fraction by the total volume. This assumes, of course, that all the fractions were collected at practically the same pressure and temperature; if not, suitable corrections must be made, using ideal gas laws, to reduce all volumes to a standard pressure and temperature, before their addition to obtain total volume.

The methane-and-lighter fraction may now be analyzed in an Orsat apparatus for oxygen by absorption in potassium pyrogallate or some other suitable absorbent; for carbon monoxide and hydrogen, by passing over cupric oxide heated to a temperature sufficient to oxidize carbon monoxide to carbon dioxide and hydrogen to water but not high enough to affect methane. With oxygen and hydrogen thus removed from the gas phase, the carbon dioxide may be absorbed in caustic potash and the residue of nitrogen and methane analyzed by slow combustion over a glowing platinum spiral.

The ethylene-ethane fraction is analyzed for ethylene by passing over saturated bromine water. The propylene-propane and butenes-butanes fractions are similarly treated with bromine water and their unsaturated content determined.

Cross Residue Gas

Having the composition of these fractions and their percentages in the original gas sample, it is an easy calculation to obtain the final and complete analysis as illustrated in Figure 5, an analysis of Cross residue gas. In this case, readings were taken from which a fractional distillation curve could be plotted.

The analysis of this particular sample of Cross residue gas shows as much as 1.52 GPM of amylenes-and-heavier. It would be suitable for use (after treatment) as high-grade antiknock aviation gasoline. Sufficient butenes-butanes could also be extracted from the gas and blended with the amylenes-and-heavier fraction to make 2.53 GPM of gasoline conforming to grade AA natural gasoline specifications but of superior antiknock properties.

Because of the comparatively low cracking temperature used, the unsaturated content of the gas is low as shown by the percentages of ethylene, propylene and butenes.

It will be readily apparent that the procedure described furnishes a very general method of completely and accurately analyzing even a very complex gas into its individual hydrocarbons. The combination of very efficient fractional distillation analysis with the large number of standardized chemical tests as described in textbooks on gas analysis furnishes a much more powerful tool for analytical and research work than either alone. In fact, any gaseous mixture possible is susceptible to fairly complete analysis by this combination of methods. This is true because we have only a limited number of compounds gaseous at ordinary temperatures and pressures, as shown by the fairly complete list of such compounds in Table 1. With the aid of this table it is almost always possible to break up a complex gas, by means of fractional distillation, into comparatively simple fractions, which may then be analyzed by standard chemical tests such as those listed in Table 2. Similar tables may be used as a guide by the research investigator in adjusting his procedure for a gas of unknown composition. The difficulties encountered will naturally increase for the higher molecular weights hydrocarbons as we here have more isomers of close boiling points. However, the complete analysis of the average refinery cracked gas into all its individual hydrocarbons from hydrogen through the butanes-butenes fraction (distinguishing butenes from butanes) using the procedure described is no more complicated than either fractional distillation analysis or any of the Orsat tests used and requires usually no more than six hours, including all calculations.

TABLE 1—COMPOUNDS WITH BOILING POINTS BELOW 100° C.

Compound—	B.P. °C.	Compound—	B.P. °C.
1. Helium	—267.0	23. Dimethyl ethylene	1.0
2. Hydrogen	—252.6	24. Butene 1	—5.0
3. Nitrogen	—195.7	25. Butene 2, cis	1.0 to 1.5
4. Carbon monoxide	—191.5	26. Butene 2, trans	2.5
5. Argon	—186.1	27. Methyl Trimethylene	4.0 to 5.0
6. Oxygen	—182.8	28. Methyl mercaptan	6.0
7. Methane	—161.4	29. Tertiary pentane	9.5
8. Krypton	—151.7	30. Ethyl acetylene	18.0
9. Xenon	—109.1	31. Crotonylene	27.0
10. Ethylene	—103.9	32. N-amylene	35.0
11. Ethane	—89.3	33. Ethyl mercaptan	36.0
12. Acetylene	—84.0	34. N-pentane	36.1
13. Carbon dioxide	—78.5	35. Isopentane	27.95
14. Hydrogen sulphide	—61.6	36. Methyl sulphide	37.0
15. Propylene	—47.8	37. Isoamylene	36.5
16. Propane	—42.2	38. Isoamylene	37.1
17. Cyclo-propane	—34.0	39. Carbon disulphide	46.25
18. Allylene	—23.5	40. Diisopropyl	58.08
19. Isobutane	—12.2	41. N-hexane	69.0
20. Isobutylene	—6.0	42. Benzol	80.49
21. Acetylene hydrate	—3.0	43. Ethyl sulphide	92.0
22. N-butane	—0.3	44. N-heptane	98.61

TABLE 2—SPECIFIC TESTS FOR GASEOUS ELEMENTS AND COMPOUNDS

Components to be determined—	Specific test
Helium	Absorption of gas sample over activated charcoal kept at liquid air temperature.
Hydrogen, carbon monoxide, total combustibles	Slow combustion over a glowing platinum spiral.
Oxygen	Absorption in alkaline pyrogallate solution.
Ethylene, propylene, acetylene and all olefines, diolefines and acetylenes	Absorption in bromine water.
Carbon dioxide, hydrogen sulphide and sulphur dioxide	Absorption in caustic solution.
Acetylene and hydrocarbons of the acetylene series	Absorption in mercuric cyanide solution or in faintly ammoniacal silver or copper salts.
Benzene and aromatics	Absorption in bromine water; absorption in mixture of fuming nitric and sulphuric acids to form dinitro-benzene which is filtered, dried and weighed.
Hydrogen sulphide	Absorption in ammoniacal cadmium chloride solution, solution of precipitate with acid, titration with standard iodine solution.
Hydrogen sulphide and sulphur compounds	Burning gas sample to form SO_2 and SO_3, oxidation to $BaSO_4$, weighing of filtered and dried precipitate.
Naphthalene	Absorption in picric acid solution to form double compound with picric acid as insoluble yellow precipitate.
Hydrogen, carbon monoxide	Partial oxidation over heated cupric oxide.

HYDROGENATION PROCESS SHOWS WIDE RANGE

(Continued from Page 226)

fuels, burning oils and the like, independent of the natural, heavy fuel content of the crude.

5. From mixed base crudes, highly paraffinic products such as gas oils, burning oils and lubricants may be produced. On the other hand, from paraffinic crudes so-called aromatic products may be formed as for example, a highly antiknock gasoline from a very paraffinic gas oil. Even from the same gas oil paraffinic burning oil and antiknock gasoline may be made. Consequently from any given supply of crude the products of the quality desired may be produced by refineries employing hydrogenation.

6. The flexibility of the process is very marked as to character of the terial. Offsetting this are the following factors: (a) The ability to balance crude run to white product demand, (b) the premium quality of products produced, (c) the low value charging stocks that may be used, and (d) the extreme utility of the process, due to its flexibility, especially where types of crudes to be refined and markets to be supplied vary from time to time.

8. Because of the oversupply of crude oil, hydrogenation in its present state of development may be considered as supplementary to present refining methods. It probably will supplant them as the supply of crude oil and demand for light products approach a balance.

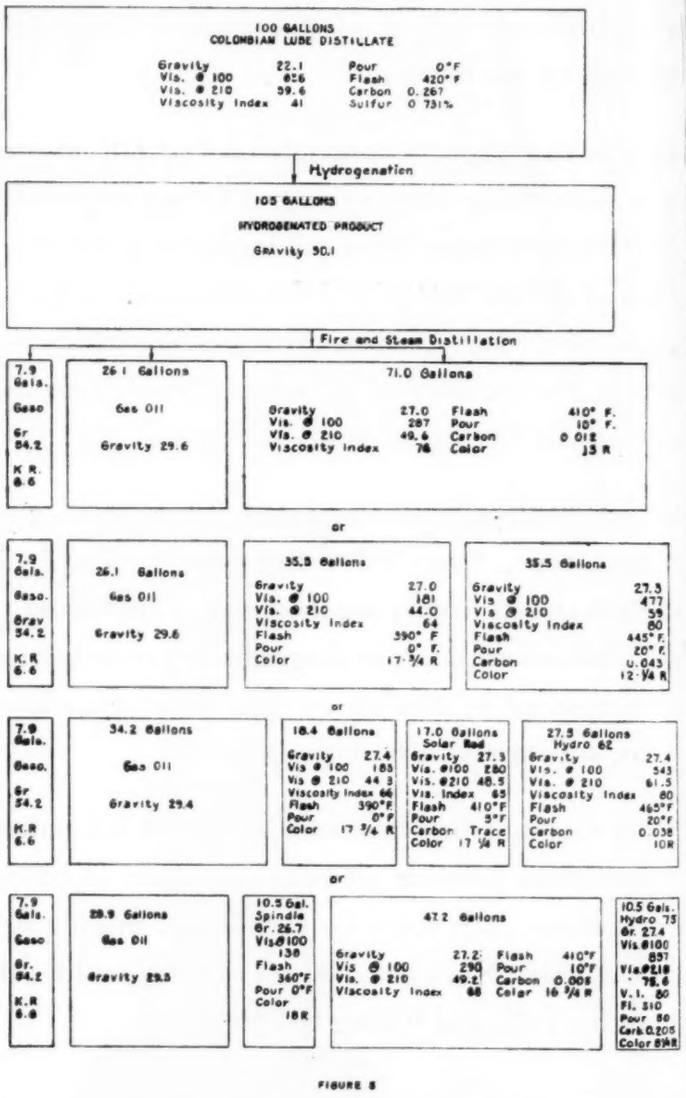

FIGURE 5

charging stock and quality of product produced. Examples have been given showing how the same plant may be used (a) for producing gasoline and gas oil, (b) very paraffinic high A.P.I. gravity burning oils from mixed base gas oils, (c) color and gum stabilizing and desulphurizing highly cracked naphthas, (d) production of paraffinic lubricants from mixed base stocks and (e) production of antiknock, high compression gasoline from paraffinic gas oils. Further, from the above examples it may be seen that from practically any grade of crude oil products of any desired quality may be produced.

7. The hydrogenation process uses compressed hydrogen, a rather costly material. Offsetting this are the following factors: (a) The ability to balance crude run to white product demand, (b) the premium quality of products produced, (c) the low value charging stocks that may be used, and (d) the extreme utility of the process, due to its flexibility, especially where types of crudes to be refined and markets to be supplied vary from time to time.

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Acknowledgment

In presenting this paper the authors wish to take this opportunity of acknowledging their indebtedness to many of their associates, but particularly to the entire staff of the high pressure research laboratory at Baton Rouge, especially W. C. Asbury, M. W. Boyer, P. J. Byrne, Jr., G. H. B. Davis, W. V. Hanks and J. M. Jennings, and to E. M. Clark, president, and F. A. Howard, vice president, of the Standard Oil Development Co.

Since the original research and development of high pressure hydrogenation of coal and oil has been one of the most if not the most costly process developments ever undertaken, the authors wish to express their respect for and admiration of the two corporations most directly responsible, the I. G. Farbenindustrie A.G., and the Standard Oil Co. (New Jersey), and their respective presidents, Dr. Carl Bosch and W. C. Teagle.

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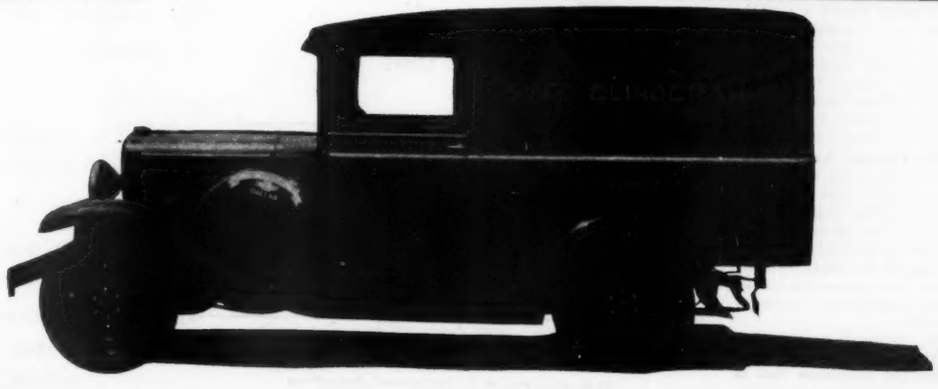


Amplifying Equipment for Pipe Lines

Suggestions Offered for Solving Problems Often Encountered by Those in Charge of Communication Systems

By L. E. Adler
Telephone Engineer, Magnolia Petroleum Co., Dallas, Tex.

The author attempts herein to describe in a nontechnical manner the application of two-way voice current amplifiers for solving transmission problems of pipe line and official communication over long lines owned and operated by oil, gas and other utility corporations.

Having decided that a new line is to be constructed, the engineer is at once confronted with these questions:

1. What kind and gauge of wire should be employed?
2. Will voice current amplifiers be required—if so, how many and where located?
3. What saving can be effected by using a smaller gauge wire and more amplifiers, as opposed to larger wire and fewer amplifiers (or none)?

Needless to say, to answer these questions in detail would go beyond the space and scope of this article. However, the writer will endeavor to explain the fundamentals with sufficient thoroughness to enable the reader to arrive at his own decisions.

Transmission Limits

It is generally conceded by telephone engineers that satisfactory commercial transmission under all weather conditions cannot be expected without amplification over routes longer than the following distances (physical circuits):

Gauge of line wire	Maximum permissible length — Copper	40% Copperweld	Iron
6 B.&S.	510 miles	222 miles	97 miles
8 B.&S.	440 miles	189 miles	86 miles
9 B.&S.	340 miles	155 miles	71 miles
10 B.&S.	273 miles	125 miles	63 miles
12 B.&S.	232 miles	98 miles	55 miles
14 B.&S.	163 miles	70 miles	44 miles

The foregoing figures are based upon the following factors:

1. An allowance is made for all of the usual losses added to a line by terminal equipment, talking through PBX switchboards at both ends, the average amount of entrance cable, etc. No allowance is made for losses due to abnormal amounts of toll cable in the circuit or for more than six bridged telephones.
2. The use of standard telephone receivers and transmitters, including the hand-set type, also standard PBX equipment.
3. A total maximum transmission loss of 18 decibels (or transmission units) is considered the desirable overall limit.

Of course it can be pointed out that in many cases a "commercial limit" grade of transmission is being obtained over routes perhaps 50 per cent longer than shown in this table. However, it is usual in such cases to find a clean, straight, open wire line with comparatively few bridged stations, little or no cable and no detached PBX stations. After all, no chain is stronger than its weakest link, consequently it is wise to keep the long line losses down to a point where a slightly weak transmitter, a "rubber-necking" bridged phone or some other minor irregularity will not push your transmission over the ragged edge. It requires only an occasional official complaint to discredit the otherwise good work of an entire communication department.

Two-Way Voice Current Amplifiers

At the risk of incurring the reproaches of some contemporaries, the following data are submitted after thorough investigation and experience as regards telephone transmission in general:

(a) No line should be constructed of larger gauge wire than necessary to secure the proper mechanical strength against the elements.

(b) With the judicious application of the proper type of amplifiers, any fairly well-constructed telephone line is capable of giving commercial transmission regardless of length, gauge and (in some cases) kind of wire employed.

(c) It is very uneconomical to use copper wire larger than 8-pound B.&S. gauge. Why? Because the increased loss due to the mutual capacity of the larger wires increases at a greater ratio than the decrease of ohmic resistance, unless an impracticable wide pin spacing is used. (See table.)

(d) In general, with wire no larger than required for strength, better commercial transmission can be obtained with amplifiers at only 3 to 8 per cent of the cost of using larger conductors.

(e) In sleetstorm areas where abnormal strength of wire is required, it is practical to give commercial transmission on copperweld wire over any distance encountered in practice.

(f) No better proof of the foregoing statements is needed than to examine the practice of the major telephone companies who are giving commercial service even over hundreds of miles of underground cable, with open wire rarely exceeding .104 or .128 diameter.

Types of Amplifiers Available

The regular commercial type of amplifiers (or "repeaters" as they are called) have been available to private wire companies either not at all or at a rental cost which made their use almost prohibitive. Further, this type, while admirably adapted for the long haul lines of the major communication companies for which it was designed, was open to certain disadvantages for isolated use on private lines, that is:

(a) Not practical on party lines.

(b) High salaried, technically trained men required to operate, install and maintain same.

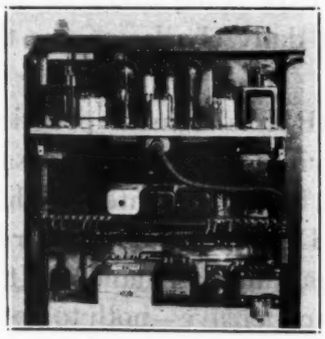
(c) Not designed for quick installation, removal or replacement.

(d) Excessive installation and maintenance costs (batteries, rotating machines and other accessories and short-life parts required).

It, therefore, follows that any amplifier which will successfully meet the conditions of service encountered in oil, gas and utility corporations should possess the following features:

(a) No batteries or source of power should be required other than the ordinary commercial lighting circuit, either alternating current or direct current.

(b) Should automatically cut itself in or out of line in event of power failure.



—Courtesy Southern Electric & Transmission Co., Dallas, Tex.

Rear view (cover removed).

(c) Entire device should be self-contained on one mounting rack with no auxiliary apparatus required. Should require small amount of floor space.

(d) Every amplifier should be adjustable to match any type or length of line by means of simple adjustment controls.

(e) Should be capable of quick and simple installation.

(f) Should be easily adapted to through line, cord circuit or terminal operation.

(g) Any amplifier or power unit should be capable of replacement by any attendant without special knowledge or tools.

(h) Each unit should carry its own indicating instruments to enable even a novice to instantly locate a defective tube (about the only probable source of trouble in a good amplifier).

(i) Every part should be practically trouble-proof and fool-proof.

Location of Amplifiers

It is not usually practicable to install this equipment in theoretically perfect locations, however, a well-designed amplifier is sufficiently flexible to allow for considerable variation in location. The following typical examples should be considered in choosing the number and location of amplifiers:

Through-line ampliers are, as the name indicates, installed as a part of the line itself and are not subject to the control of the operator. These should be placed as near as possible in the electrical center of the line, or, if more than one is used, in the electrical center of each section. (See Sketch No. 1.)

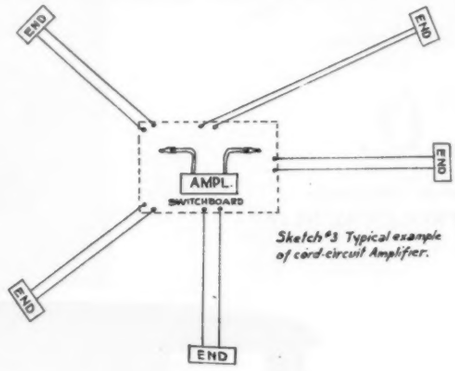
Terminal amplifiers, like the through-line type, are associated with the line rather than the switchboard, but, for maintenance or other reasons are located at the ends of the line instead of the middle of the line or section of line. (See Sketch No. 2.)

[illegible] amplifiers.—This type is wired in and forms a part of the operator's cord circuit and so arranged that any two long lines terminating on the switchboard can be connected together for boosting the transmission. Like the through-line type, the cord circuit amplifier should be located as near as practicable in the center of various groups of long lines. (See Sketch No. 3.)

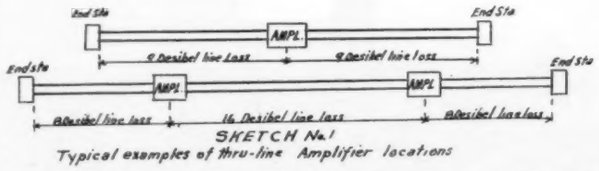
The term "electrical center" means that location which has an equal number of "decibels" of transmission loss in each direction from a given point. It may vary considerably from the geographical center, since a comparatively short piece of cable, an intermediate station or a change of gauge in the route will offset the transmission center accordingly.

Conclusion

The writer regrets that lack of space forbids going any farther into detail. However, a cordial invitation is extended to the writer's friends and associates in the oil and gas communication business to request information on specific problems to be answered to the best of his ability.

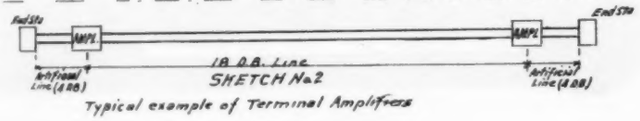


Sketch #3 Typical example of cord-circuit Amplifier.



SKETCH No.1

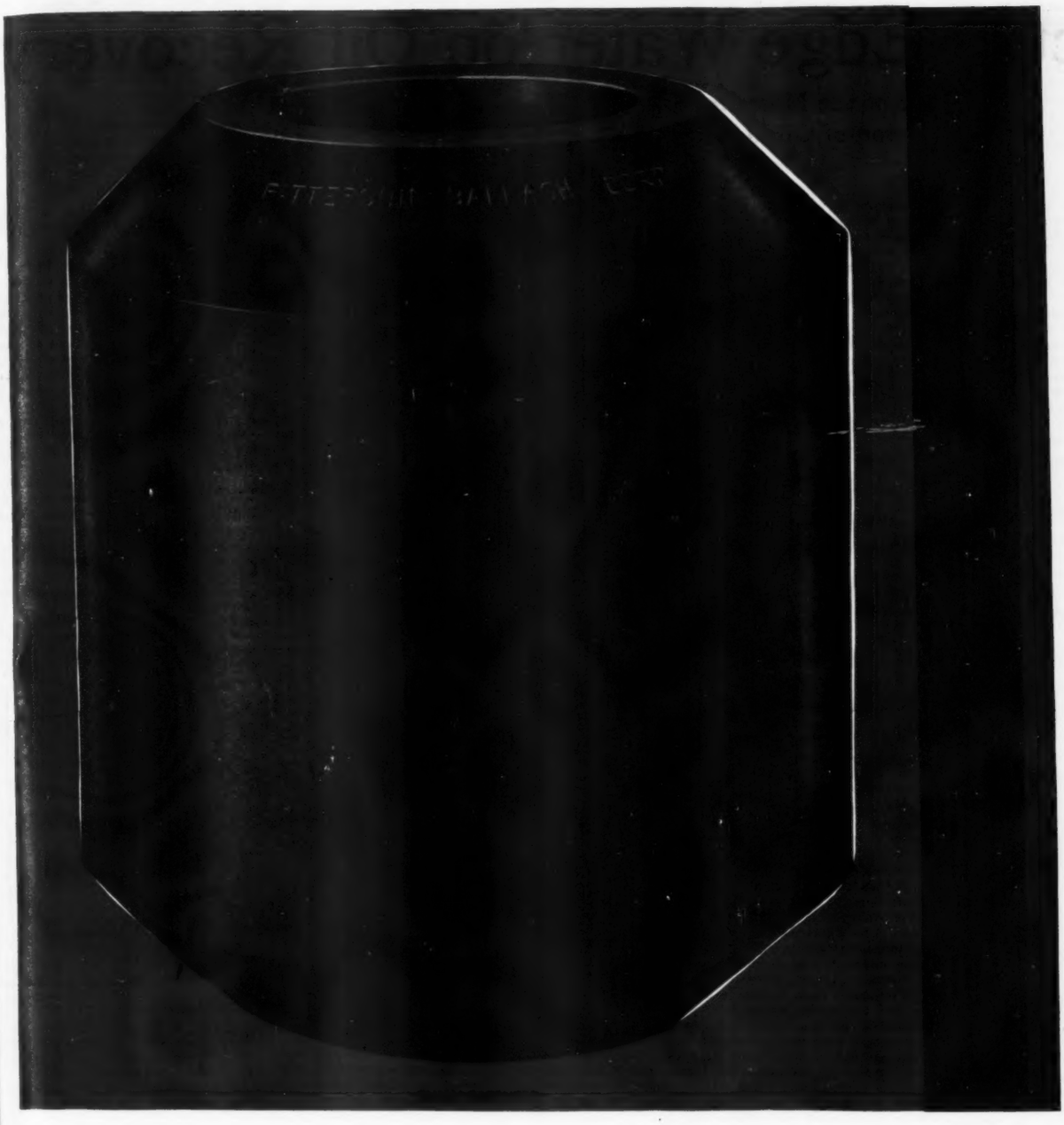
Typical examples of thru-line Amplifier locations



SKETCH No.2

Typical example of Terminal Amplifiers

CONSTRUCTING PIPE LINE



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Effect of Edge Water on Oil Recovery

One of the Most Important Factors Governing the Production of Oil in Many Fields. Need for Further Study

By H. H. Wright
Petroleum Engineer, Gypsy Oil Co.*

In many fields edge water is one of the most important factors governing the production of oil. Possibly this fact is not appreciated by many producers except in so far as it may bring about a loss in production from wells drilled on the flanks of structures. In the light of artificial flooding as practiced in New York and Pennsylvania, and of the beneficial effect of natural water-flooding on many wells and leases in the Mid-Continent and elsewhere, it seems reasonable to suppose that very few phases of the petroleum industry hold greater promise for future benefit than the study and control of the natural water drive.

Rate of Water Encroachment

The rate of movement of water in artificially flooded areas has been referred to as so many feet per unit of time, usually from an injection well toward surrounding producing wells. This definition is vague when used in reference to the movement of natural edge water, in as much as such factors as sand thickness, steepness of dip and horizontal extent are not considered. In the ultimate analysis, only the vertical component of movement affects the production of oil in the natural drive, and in order to define the rate of water encroachment more exactly, such a term as acre-feet per unit time might be used. Thus, where one well is located to each 10 acres a vertical movement of 5 feet in the water level in a year would be defined as an encroachment of 50 acre-feet per year, and where one well is located to each 20 acres, as 100 acre-feet per year. Such a definition as this is entirely arbitrary, but it takes into consideration to a certain extent the influence of well spacing, and consequent sand drainage, on the rate of water movement.

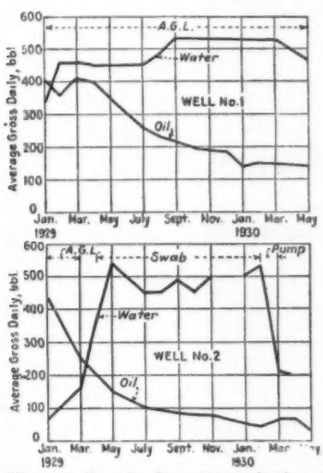

Figure 1—Capacity for water production of two adjacent wells in Earlsboro Field.

The rate of movement is considered to be an important function of water encroachment, for it is believed that the efficiency of recovery by natural water flood depends a good deal upon the rate of movement. In general, rapid encroachment is thought to effect a poor recovery because of the differential in favor of the movement of water through a sand body and the consequent tendency to trap oil in the sand. Slow movement, on the contrary, is thought to bring about a partial displacement of oil from the sand pores and to move oil up the dip with little by-passing. This effect may be illustrated by the well sustained production of some edge wells, where only a small amount of water is produced over a considerable period of time. It may be contrasted to wells having a more or less normal decline up to a certain point, after which the rate of oil production is suddenly increased and maintained over a short period with a subsequent extremely rapid decline in oil production and increase in water. Wells of the latter type appear to be more particularly those from which oil has been produced at a rapid rate, such as air-gas lift wells, or those in small pools where the structure has been completely drilled in a short time. However, this effect has been observed in wells not of either of these two types, indicating that other factors influence the rate of travel. This may introduce the observation that wells evidence a capacity for water production.

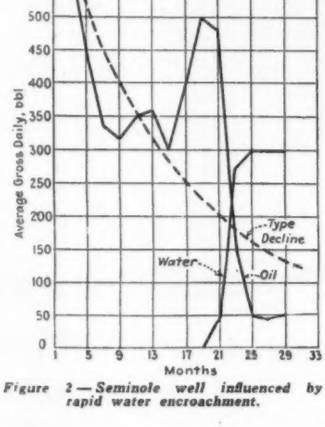

Figure 2—Seminole well influenced by rapid water encroachment.

Production data on two adjacent wells in the Earlsboro Field, having similar structural positions, illustrate the apparent capacity for water production. These data are shown graphically in Figure 1, and appear to indicate that both wells reached their capacity for water production at about 530 bbls. daily. It appears significant that while well No. 1 reached a maximum fluid production in excess of 800 bbls. daily in the first part of 1929, it produced a maximum amount of 530 bbls. of water when the total fluid production was as low as 670 bbls. daily. Well No. 2 produced a maximum of 540 bbls. of water daily when the oil production was 150 bbls. The decrease in oil production from 150 bbls. to 45 bbls. apparently did not increase the capacity for water production, for in February, 1930, the well produced 530 bbls. of water and 45 bbls. of oil. The evidence from these two wells indicates that the maximum rate of water movement through the sand had been reached for the existing conditions of water head and sand characteristics related to these wells, particularly in view of the fact that well No. 1 has 26 feet of sand penetration as compared with 14 feet in well No. 2

That the rate of water encroachment in different fields varies is illustrated in the Greater Seminole area, where water encroachment has been more rapid in some pools than in others. In the Seminole City Pool, 13 representative wells had an average elapsed time of 618 days between completion and the day that water appeared. In the Mission Pool the average time was 272 days for eight representative wells. The recoveries from these pools will serve as examples of the effect of natural water flooding. All evidence tends to indicate that three factors mainly control rate of water movement. These are: (1) pressure head on the water; (2) sand permeability, or resistance to flow; (3) rate of depletion of oil and gas content.

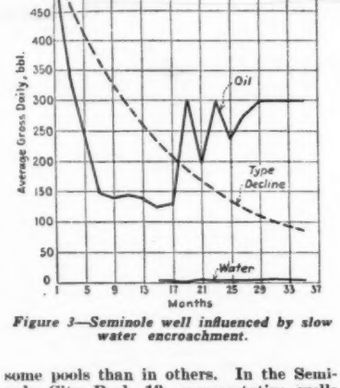

Figure 3—Seminole well influenced by slow water encroachment.

Effect of Water Encroachment

It is customary in production-control work to make use of type decline curves which represent the average performance of a number of wells. Often such curves are influenced by two or more distinct types of production, as well as by several production methods. It is believed that more accurate comparisons could be made by classifying production and preparing type declines for the various classes. Ordinarily this is not done to such an extent as to allow of close comparisons.

The type decline curves shown in Figures 2 to 7, inclusive, represent the average performance of 20 or more normal wells under certain uniform methods of operation. These curves include wells influenced by varying degrees and rates of water encroachment, and represent the average expectancy of wells in the district from which they were compiled.

Figure 2 compares the decline curve of a Wilcox sand well in Seminole with the average curve for Seminole Wilcox sand wells. The production of this well has been influenced by a rapid rate of water encroachment. Figure 3 compares the decline of a well influenced by a slower rate of encroachment. Both wells were completed at approximately the same time, and obviously the more rapid rate of water movement has returned the greatest amount of oil to date. However, the slower encroachment will yield considerably more oil ultimately, in spite of the fact that the well with the slower water movement had the smaller initial production and had a rapid decline during its flush stage. It may be inferred from these examples that a controlled rate of water movement might have promoted more efficient recoveries in the well shown in Figure 2, by an increased rate of movement, and in that on Figure 3 by a retarded rate.

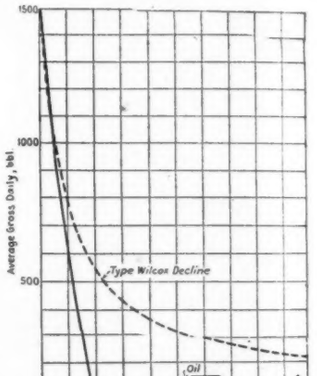

Figure 4—Seminole well slightly influenced by water encroachment.

Figure 4 shows a Wilcox well in the same area as the wells shown in Figures 2 and 3. This well serves as an example of flush production but slightly influenced, if at all, by water head. Slowly encroaching water is maintaining a small daily production over a long period of time. Evidently in a well of this type the depletion of oil and gas originally in the sand has been at a rate in excess of the ability of the water to travel through the sand; that is, gas expansion is assumed to be the direct cause of the movement

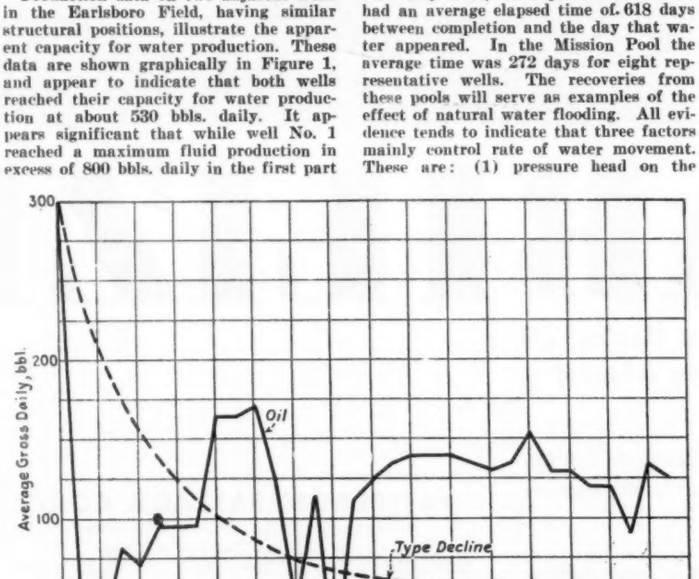

Figure 5—Cromwell well under influence of natural edge-water flooding.

*Before A.I.M.E., Tulsa, October, 1930.

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of oil into the well. Were this curve characteristic of Seminole production, more particularly without the slow water encroachment and sand flooding, Seminole would long since have been history.

Decline Curve in Cromwell

Figure 5 is a decline curve of a well in the Cromwell Pool. It shows a well sustained rate of production, and is an example of the beneficial effect of a slow rate of water encroachment. Although this well has made water in small amounts only, other wells surrounding it have produced considerably more, about one-half of the 80-acre lease having been on the edge of the pool originally. It is interesting to note that eight months ago the production of water in this well stopped, and that no water has been produced since. It is thought that this behavior is the result of a change made about a year ago from individual pumping units to pumping by central power, whereby all wells on the lease excepting this one, which is still produced with an individual unit, are produced at a slower rate. The approximate recovery from this well has been 218,000 bbls., whereas under the type decline recovery would have been about 170,000 bbls. The average recovery per acre for the lease is slightly over 8,500 bbls., while this particular well has produced 21,800 bbls. per acre.

The decline curves of two wells in the Burbank Field, the recoveries from which are influenced by water-flooding, are shown in Figures 6 and 7. These two wells were completed at the same time, with initial productions of 840 and 1,440 bbls. Individual well gauges are not available for the period between completion and the seven month's production. However, the well in Figure 6 serves as an example of the benefit of natural water-flooding. The recovery from this well from an average monthly production of 49 bbls. daily in the seventh month to the seventy-fourth month does not quite equal the average recovery of wells higher on the structure, where gas is the predominating expelling force, but this well gives promise of exceeding the recovery of the higher wells in the near future. The comparative recoveries of this well and the average of wells on top of the structure for the period indicated are approximately 34,400 and 36,400 bbls., respectively.

Figure 7 is an example of a much better recovery due to water-flooding. Recovery from this well for the period from the seventh to the seventy-third month, inclusive, has been about 80,700 bbls. as compared to the average recovery of approximately 36,400 bbls. for wells not benefited by water-flooding. It may appear that the average decline curve should have been tacked on at 69 bbls., which represents the largest average daily production for any month beginning with the seventh. As it happened, the wells shown in Figures 6 and 7 each had an average daily production of 49 bbls. for the first month for which individual gauges are available. Both wells at that time were under the influence of water drive or flooding, and, consequently, both should be compared to the average decline curve for wells on top of the structure beginning with the first month. If the average curve had been tacked on at 69 bbls., the recoveries would have varied little from those given, and the principle illustrated would have remained unchanged. Actually, the recoveries from 69-bbl. average production on would be approximately 71,500 bbls. for the well and 42,000 under the average curve.

Methods by Which Water-Flooding Can Be Made More Effective

It is thought that the efficiency of natural edge-water flooding is a function of the rate of encroachment; but it does not follow that the rate most effective in one locality will return a high recovery in another. The most effective rate of natural water movement must depend upon sand conditions, nature of oil and water content, structure, water head, well spacing, production methods, rate, method and sequence of drilling, and possibly other factors. Of the factors enumerated, well spacing, production methods, and rate, method and sequence of drilling can be controlled. Earlier in this paper, it was shown that the recovery from parts of several oil fields in Oklahoma is influenced by natural water-flooding. It is probable that the energy in natural edge water is susceptible to efficient control, as is the energy of gas expansion. It is conceded that it will be more difficult to control than gas, but the possibilities of making the greatest use of natural water-flooding give promise of large returns, particularly in such fields as Seminole, where the recovery of oil appears to be greatly influenced by water, even in the flush stage of production.

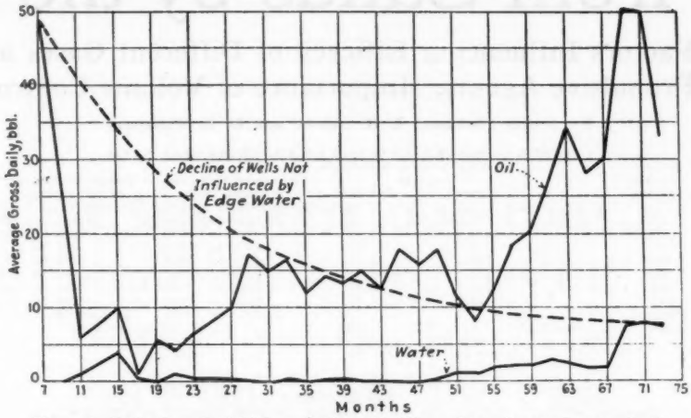

Figure 6—Burbank well; initial production, 840 bbls.; effect of natural water flood.

The most suitable method of drilling, spacing and producing wells so as to make most use of natural water-flooding can only be made effective under some plan whereby the pool or field is developed and operated as a unit. The recovery from natural water-flooding is of sufficient magnitude to justify serious consideration of its employment to the fullest extent.

Conclusions

1. The recovery of oil from many fields is influenced by natural water-flooding, and in many fields, or parts of fields, this natural flooding has been one of the main factors contributing to efficient recovery.

2. The rate of water movement greatly influences the effectiveness of natural water-flooding.

3. The factors largely governing the rate of movement are: Hydrostatic head of the water, permeability of the sand body and rate of removal of oil and gas from the sand.

4. The most effective rate of movement must be governed by sand conditions, nature of oil and water content, structure, water head, well spacing, production methods, and rate, method and sequence of drilling.

5. At least three factors governing the effectiveness of natural water-flooding can be controlled. They are: well spacing, production methods, and rate, method and sequence of drilling.

6. The rate of edge-water encroachment can be controlled, to some extent at

(Continued on Page 420)

Velocity of Oil Flow Through Tubing

Study of Flow Velocities Believed to Yield Valuable Information and Justifies Further Investigation

By E. L. Davis
Production Engineer, The Texas Company of California*

There have been many attempts to devise formulas for flowing efficiency and flow friction of oil-gas mixtures in oil well flow tubes. Actually, however, flowing efficiency is rarely any real concern of the oil producer and flow friction formulas contain so many unknown variables as to be of little, if any value.

The production engineer is generally concerned with producing as much oil as possible with a minimum expense per barrel, and with the lowest possible net gas-oil ratio. These ends frequently are opposed to each other and the gas-oil ratio usually is sacrificed. In competitive operations, such as in town lot fields, high current production is the sole interest.

In conservative operation the greatest possible amount of oil obviously should be produced by natural flow unless the net formation gas-oil ratio can be improved by circulation gas. In practice this condition frequently exists. It would be a great advantage if the flowing condition of a well could be analyzed to determine the best possible producing status. Anticipating the death of a well so that gas-lift could be started immediately after the death, or preferably before, would save both production and expense. Frequently it happens that circulating gas fails to help a flowing well, or will not flow it after it has stopped flowing naturally. A knowledge of the laws governing flow would save considerable expense in testing such cases. A predetermination of probable pressures and amounts of circulating gas needed to flow wells and give best possible producing conditions would help in designing compressor installations.

The optimum producing status of an oil well generally may be obtained by the conditions that subject the producing formations to the least possible back pressure. This pressure is made up of the weight of the fluid column, frictional resistance to flow and the reaction from the acceleration of the fluid mass. A mathematical calculation of these components to arrive at a condition giving a minimum summation is impractical. Formulas would be complex and the results untrustworthy because it is impossible to assign proper values to the many variables involved.

However, many of the variables involved in flowing through tubing are functions of the velocity. They include flow friction, acceleration and the pow-

(Continued on Page 419)

*Before Petroleum Division AI.M.E., Tulsa, October, 1930. Copyright 1930 by A.I.M.E., Inc.

TABLE 1.—*Flowing Conditions of Wells*

Well Numbers	1	1-A	2	2-A	3	4	5	6	7	7-A	8	9	10	11	12	13
Depth of casing, ft.	6850	6850	6825	6825	7125	6900	8000	7960	6850	6850	6800	6800	3000	6500	7255	7950
Size of casing, in.	5	5	5 with 3	5 with 3	5	5	5 with 3	5	5	5	5	4¾	6⅝	5¾	5¾ with 3	6⅝ with 5
Top of perforations, ft.	6290	6290	linear 6275	linear 6275	6265	6370	linear 7686	7780	6326	6326	6250	6300	2800	5479	linear 5726	linear 7475
Depth of flow tube, ft.	6250	6250	Casing	6280	6233	6600	7560	7000	Casing	Casing	6200	6300	2800	6000	6280	7250
Size of flow tube, in.	2½	2½	5 & 3	2½ & 1¼	2¾	2½	2½	2½	Top of Perfs. 6300	Top of Perfs., 6100	2½	4¾	3	2½	2½	3
Critical Conditions																
Gross oil, bbl. per day	800	950	680			370	30	135	1090	1460			720	137	62	175
Gross gas, M. cu. ft. per day	560	475	450			500	400	200	400	780			580	380	350	490
Gross gas-oil ratio	700	500	660			1350	13300	1480	367	540			808	2770	5620	2810
Net gas, M. cu. ft. per day	560	100	450			300	100	200	400	120			200	380	350	490
Net gas-oil ratio	700	105	660				3333	1480	367	82			278	2770	5620	2810
Casing pressure, lb. per square inch	700	720	500			475	300	250	800	700			270	400	225	250
Tubing-shoe velocity	5.7	5.2	1.65 & 4.83			6.0	6.7	4.3	1.4	2.6			7.7	5.0	7.6	6.5
Velocity in casing below tubing	1.65	0.75	1.65 & 4.83				1.12	1.25	1.4	1.1			.9	1.1	1.8	1.75(6⅝")
Volumetric gas-oil ratio under Pressure — Gross	2.56	1.78	3.3			7.2	150.9	15.3	1.18	1.97			7.4	17.7	61.1	28.2
Volumetric gas-oil ratio under Pressure — net	2.56	0.375	3.3			7.2	27.6	15.3	1.18	.305			1.5	17.7	61.1	28.2
Optimum Conditions		1350		610	190	475	70	130			300	370				
Barrels oil per day		1400		720	700	930	745	525			840	1060				
Gross M. cu. ft. per day		1070		1180	3680	1960	10600	4030			2800	2870				
Gas-oil ratio		610		410	240	400	200	250			260	300				
Casing pressure		14.0		10 & 22	14.5	12.5	18.5	9.5			16.5	6.5				
Tubing-shoe velocity																

Recovery from Sands by the Gas Drive

Factors Influencing Efficacy of Different Gases as Propulsive Agents. Importance of Volume Control

By Joseph Chalmers,[1] I. H. Nelson[2] and D. B. Taliaferro[3] *

Stimulative methods of production, whereby the total recovery of oil from natural reservoirs is increased, have come into considerable prominence during the past 15 years. In many oil producing areas properties considered ready for abandonment by ordinary producing methods have responded to some form of stimulation, and their economic lives have been extended. The stimulative method having widest application is the injection of air or gas into the reservoir formations through selected input wells and is commonly referred to as the "gas drive." As a result of the many successful "gas-drive" operations operators are depending more and more upon this method for increasing the ultimate recovery of oil from their properties.

A number of factors influence the efficacy of different gases as propulsive agents in recovering oil from sands. Gases of high density and viscosity show a tendency toward a slightly higher efficiency than those of lower density and viscosity. The solubility of the gas in the oil also affects the efficiency of oil recovery. Not only does dissolved gas decrease the viscosity of the oil, but dissolved gas that expands from solution in the oil tends to increase the effectiveness of a "gas drive." Interfacial tension between the oil and the gas and its effect upon the recovery of oil by gas injection are factors of which little is known. Dr. A. G. Loomis[4] expressed the opinion that interfacial tension probably plays a minor role in the recovery of oil, except under conditions that produce a gas-oil foam. In connection with the above physical properties that influence the action of a pressure medium, control of the injected volume of the pressure medium is perhaps the major factor. The rate of gas injection determines to a great extent the amount of slippage and the resulting efficiency of the operation. The importance of volume control is realized when one considers that frequently it is the only factor that is under complete control of the operator.

Pressure Media

Data concerning the behavior and the relative efficiencies of various pressure media are helpful in considering a program for starting a "gas drive" in an oil pool. Frequently there is no choice as to which pressure medium may be used. Either gas is not available and air must be used; or, if gas is available in sufficient quantities, there is no choice as to kind. However, where gas is recycled either "dry" or "wet" gas is usually available. The return gas from producing wells usually contains an appreciable percentage of gasoline vapor, and the operator must then decide whether or not the gasoline vapor should be removed before the gas is returned to the sand.

The oil recovery section at the Petroleum Experiment Station of the Bureau of Mines, Bartlesville, Okla., has conducted a series of experiments to obtain laboratory data pertaining to the relative merits of various gaseous media in the recovery of oil from sands by gas injection. The data obtained do not afford a quantitative analysis in so far as field operations are concerned but give some idea concerning the function of the physical properties of the gases in the recovery of oil. The comparative results brought out by the laboratory experiments, however, should hold true to a certain extent in the field, and it is hoped that the data presented will aid in solving some of the problems encountered in actual operation.

TABLE 1—SCREEN ANALYSIS OF EXPERIMENTAL SAND

Screen, meshes to inch	Weights on or between sieves, Grams	Weights on or between sieves, Per cent	Range of diameter of grains, inch	Range of diameter of grains, mm.
35	2.6	0.26	Greater than 0.0164	Greater than 0.417
48	12.2	1.22	0.0164 to .0116	0.417 to .295
65	154.8	15.48	.0116 to .0082	.295 to .208
80	5.0	.50	.0082 to .0069	.208 to .175
100	321.1	32.11	.0069 to .0058	.175 to .147
150	221.8	22.18	.0058 to .0041	.147 to .104
200	239.5	23.95	.0041 to .0029	.104 to .074
325	38.2	3.82	.0029 to .0017	.074 to .043
Finer	2.5	.25	Less than .0017	Less than .043
Loss	2.3	.23		
	1,000.00	100.00		

TABLE 2—ANALYSIS OF OIL USED IN EXPERIMENTS

Sample 29730

Recovery section storage crude oil—in storage 10-16-29; specific gravity, 0.860; A.P.I. gravity, 33.0; per cent sulphur, 0.21; per cent water, nil; Saybolt Universal viscosity at 70° F., 66 sec.; pourpoint, below 5° F.; Saybolt Universal viscosity at 100° F., 50 sec.; color, brownish black.

DISTILLATION, BUREAU OF MINES, HEMPEL METHOD

Air distillation, 300 cc. Barometer, 745 mm. First drop: 70° C. (158° F.)

Temperature, °C.	Per cent cut	Sum, per cent	Sp. gr. of cut	°A.P.I. of cut	Viscosity at 100° F.	Cloudes, °F.	Temperature, °F.
Up to 50	...	...			....	....	Up to 122
50- 75	0.5	0.5			....	....	122-167
75-100	3.2	3.7	0.721	64.8	....	....	167-212
100-125	5.1	8.8	.741	59.5	....	....	212-257
125-150	5.4	14.2	.759	54.9	....	....	257-302
150-175	6.2	20.4	.781	49.7	....	....	302-347
175-200	4.9	25.3	.798	45.8	....	....	347-392
200-225	5.8	31.1	.814	42.3	....	....	392-437
225-250	6.3	37.4	.827	39.6	....	....	437-482
250-275	6.9	44.3	.844	36.2	....	....	482-527
Vacuum distillation at 40 mm.:							
Up to 200	3.3	3.3	0.861	32.8	41	5	Up to 392
200-225	7.2	10.5	.867	31.7	47	15	392-437
225-250	6.5	17.0	.878	29.7	61	35	437-482
250-275	6.6	23.6	.891	27.3	93	55	482-527
275-300	6.4	30.0	.899	25.9	180	75	527-572

Residum, 25.4 per cent; distillation loss, 0.3 per cent; carbon residue of residum, 7.5 per cent; carbon residue of crude, 1.9 per cent.

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline (endpoint, 212° F.)	3.7	0.721	64.8	.....
Total gasoline and naphtha	25.3	.763	54.0	.....
Kerosene distillate	5.8	.814	42.3	.....
Gas oil	21.7	.847	35.6	.....
Nonviscous lubricating distillate	12.4	.869-.892	31.3-27.1	50-100
Medium lubricating distillate	7.5	.892-.901	27.1-25.6	100-200
Viscous lubricating distillate	1.6	.901-.903	25.6-25.2	Above 200
Residuum	25.4	.944	18.4	.....
Distillation loss	.3	...	...	.....

Apparatus and Materials

The experiments were performed with flow tubes, which were the containers for the reservoir sands. Each tube consisted of a 6-foot section of 6-inch pipe with blind flanges at each end and with openings for wells and pressure-gauge connections, as shown in Figure 1. The inside diameter of the wells was three-eighths inch. The pressure-gauge connections were threaded for one-quarter-inch standard pipe fittings. All openings in the flow tubes were covered with screen to hold the sand in place. The volumetric capacity of the flow tubes with the two miniature wells in place, as determined by calibration with water at 70° F., was 34,485 cc. (2,104.4 cubic inches). The reader is referred to Technical Publication 144, American Institute of Mining and Metallurgical Engineers, Oil Recovery Investigations of the Petroleum Experiment Station of the United States Bureau of Mines, for further details of the flow tubes and the experimental hookup.

The flow tubes were filled with a white, fine-grained, quartz sand taken from an outcrop of the Wilcox formation at Roff, Okla. A screen analysis of the sand is given in Table 1. The porosity of the sand when tightly packed in the flow tubes was about 30.6 per cent. The volume of voids in the sand was determined by the compressed gas pressure-drop method described by Rawlins and Wosk.[5]

The oil used was Bartlesville sand crude obtained from wells just south of the city of Bartlesville. The original gravity of the oil was 34° A.P.I., but it had weathered in storage to 33° A. P.I. A Hempel distillation of the oil is given in Table 2.

Five gases were used in the series of experiments—propane, a mixture of propane and dry gas, air, dry gas, and helium. The propane-dry gas mixture (37.26 per cent propane and 62.74 per cent dry gas) had the same specific gravity as air. The dry gas was Bartlesville city gas. Owing to the continually changing composition of the gas supplied by the city mains a supply of gas sufficient to complete the series of experiments was stored in a high pressure storage system installed for the purpose. The composition of the dry gas in storage, as determined by a combined fractional distillation and combustion analysis, is shown in Table 3. The solubility of each of the five gases in the oil is given in Table 4.

TABLE 3—ANALYSIS OF DRY GAS

Constituents—	Pct.
Carbon dioxide	1.80
Illuminants	...
Oxygen	.48
Butane plus	1 67
Methane	75.22
Ethane	6 95
Propane	3 84
Nitrogen	10.04
Total	100.00

TABLE 4—SOLUBILITY OF PRESSURE MEDIA IN OIL USED

Pressure medium—	Solubility— 35 lbs. per sq. in. gauge cu. ft. per bbl.	Solubility— 50 lbs. per sq. in. gauge cu. ft. per bbl.
Helium	3 0	0.7
Air	1.5	3.0
Dry gas	4 7	9.5
Propane-dry gas mixture	17 0	34.0
Propane	157 2	407 0

Experimental Procedure

The experiments were carried on in a constant-temperature water bath maintained at 70° F. The sand-packed flow tubes were first charged with oil saturated with dry gas at 200 pounds pressure and at 70° F. The oil content of the flow tubes was then partly depleted by "natural flow" by opening the producing well and allowing it to produce what oil it would through a one-eighth-inch flow nipple by virtue of the propulsive force of the gas expanding from solution in the oil. The average recovery of oil by "natural flow" was 23.3 per cent. Under normal conditions the recovery did not vary more than one-half of 1 per cent from this average. The "gas drive" was started with the flow tubes thus partly depleted, and subsequent runs were made using one-sixteenth-inch and one-thirty-second-inch flow nipples in the producing wells. The gas input well in each experiment was connected to a calibrated reservoir cylinder containing the pressure medium.

Two general types of gas injection runs were made. In one, the pressure media were forced at a constant input pressure of 25 pounds per square inch gauge through the artificial body of sand partly saturated with oil. In the other, the pressure media were forced through the body of sand partly saturated with oil at a constant input volume of 0.178 cubic foot per minute. This new rate was chosen to correspond with the average rate of injection for propane during the first 30 minutes of the constant input-pressure run, which was the highest average rate obtained in the constant input-pressure experiments.

In the first mentioned type of gas-injection experiments, the pressure of 25 pounds per square inch gauge was maintained constant at the input well by means of a pressure regulator. The volume of gas injected into the sand at this pressure for each 5-minute interval was measured by the pressure drop in the reservoir cylinder, which was also maintained at a constant temperature of 70° F. Correction factors were applied for the supercompressibility of the gas used.

(Continued on Next Page)

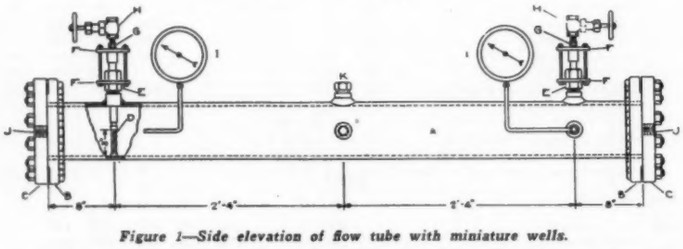

Figure 1—Side elevation of flow tube with miniature wells.

A—Six-inch, 19-pound black wrought steel pipe, 6 feet long. B—Companion flange threaded on 6-inch pipe so that end of pipe is flush with face of flange. C—Blind flange. D—Perforated screen pipe. E—Stuffing box. F—Anchor clamps and anchor bolts. G—Flow nipple or "bean." H—High pressure globe valve. I—Test pressure gauges. J—One-inch threaded hole through blind flange with screen bushing for pipe connections. K—Thermometer well.

*Reprinted from United States Bureau of Mines Report of Investigations 3,035.

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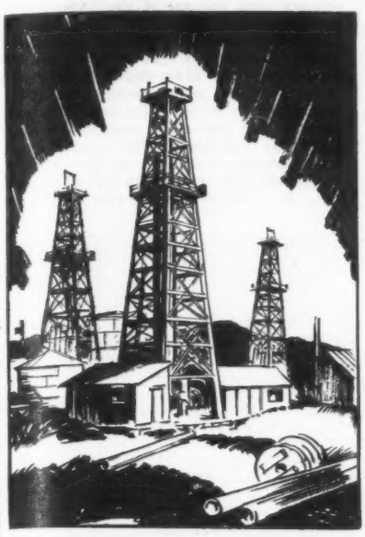
[4]Loomis, Dr. A. G., senior fellow, Mellon Institute, Pittsburgh, Pa.

[5]Rawlins, E. L. and L. D. Wosk, Leakage from High Pressure Natural Gas Transmission Lines, Bull. 265, Bureau of Mines, 1928, pp. 5-18.



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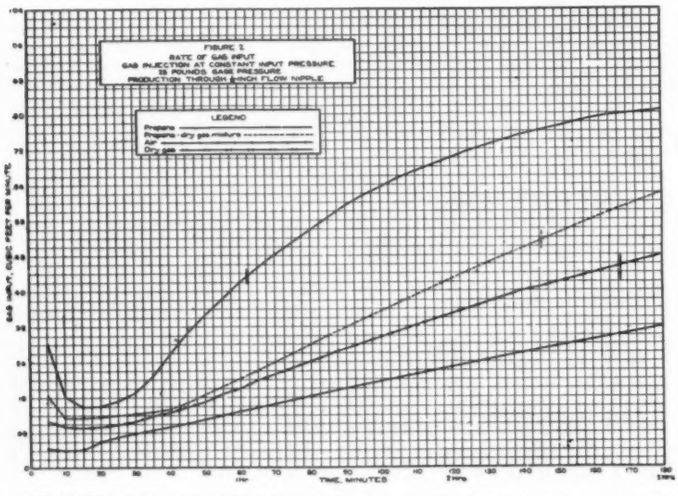
This method of measuring the volume input could be used only for the pressure media that remained in the gaseous state under the reservoir pressure. Propane, having a vapor pressure of 117 pounds per square inch at 70° F. was in the liquid state in the reservoir cylinder, and therefore the rate of propane injection at the constant-input pressure was measured by an orifice.

In the constant input volume experiments, the input volume was regulated by means of critical flow through a small orifice. According to Cattell and Rawlins,[8] the flow of gas through a small orifice, under critical flow conditions, is independent of the downstream pressure and is directly proportional to the absolute upstream pressure. Also, critical flow is assured when the absolute pressure at the downstream side of the orifice is less than 50 per cent of the absolute upstream pressure. If the upstream pressure remains constant the flow does not change, regardless of changes in the downstream pressure, within the limits defined by critical flow. Due to the variation of the pressure at the input well



NOTE—The distinctive vertical lines through the curves indicate the times at which 22 per cent of the original oil content of the sand was recovered by gas injection using the different pressure media. The time necessary for air was 190 minutes which is beyond the range of the chart.

or downstream pressure of the orifice, an orifice had to be chosen for each pressure medium that would maintain critical flow at the rate of 0.178 cubic foot per minute through the range of downstream pressures for each experiment. A pressure regulator was used in conjunction with the small orifice to maintain a constant pressure at the upstream side of the orifice. The rate of gas injection was measured immediately before and after each run. An additional check of this rate was obtained from the pressure drop in the calibrated reservoir cylinder.

Results

Gas Injection at Constant Input Pressure

The results of the experiments in which input pressure during gas injection was maintained constant at 25 pounds per square inch are given in Figures 2 and 3 and Table 5. Figure 2 shows that the more soluble pressure media passed into the partly depleted sand more readily than those less soluble. This may be due partly to a reduction in volume of the more soluble gases by absorption in the oil at the point of injection. The effective frictional resistance to flow of the gas was decreased by the shrinkage in gas volume according to the solubility of the gas in the oil. As the unabsorbed gas moved the oil and its dissolved gas through the sand toward the producing well the dissolved gas came out of solution because of lower pressures about the producing well. This explanation is supported by the fact that the pressure differential between the pressure gauge connections of the flow tube was lowest for propane and successively higher for the less soluble pressure media.

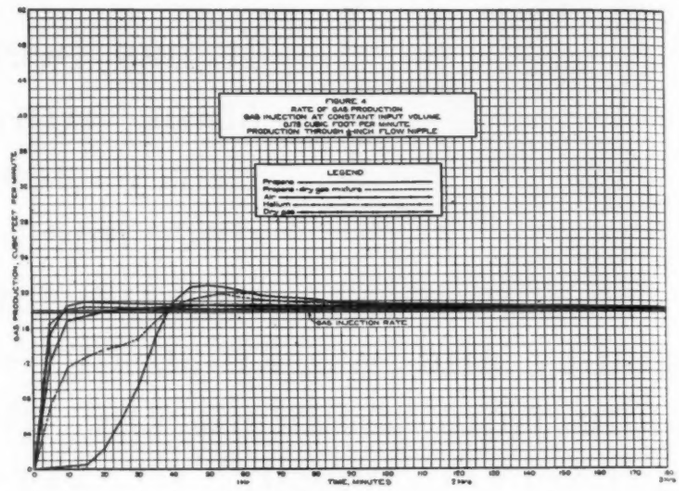
Another factor that affected the rates at which the various gases passed through the body of sand was the relative viscosity of each of the gases. However, the relative viscosity of the gases does not account for the wide difference in rates shown in Figure 2, as both propane and propane-dry gas mixture had a greater viscosity than dry gas and therefore should have passed more slowly into the sand body, except for the counteracting factor, solubility. Evidently the effect of solubility more than offset the effect of the greater viscosity of these gases and permitted them to pass into the sand more readily than dry gas.

The specific gravity of each of the pressure media used probably had little effect upon the rates at which they flowed through the partly depleted sand body because the velocities were not great enough to cause turbulent flow.

Figure 3 shows that injection of the more soluble pressure media resulted in higher rates of oil production and therefore quicker recovery of the oil. This was not due to the efficiency of the prospective pressure media in each instance but was due in part to the higher injection rates shown in Figure 2. Using total gas-oil ratio as a measure of the efficiency with which a given amount of oil was recovered propane was most efficient and dry gas least efficient. Although the propane-dry gas mixture was 11 times more soluble than air in the oil that was used its efficiency in the propulsion of oil through the sand was not very different. Dry gas, although three times as soluble in the oil as air, was considerably less efficient as a propulsive agent.

The data given in Table 5 indicate that the specific gravity of a gas influences its efficiency as a pressure medium if the efficiency of a pressure medium is measured by the ratio of the volume of gas injected to the amount of oil produced. Propane with a specific gravity of 1.523, the heaviest gas used, was most efficient. About the same amount of air was required to recover 22 per cent of the original oil content of the gas as was required of the propane-dry gas mixture. The specific gravity of the propane-dry gas mixture was the same as air, 1.000. Dry gas with a specific gravity of 0.690 was least efficient. From these data the specific gravity of the pressure media serves as an index of their relative efficiency by this method of comparison.

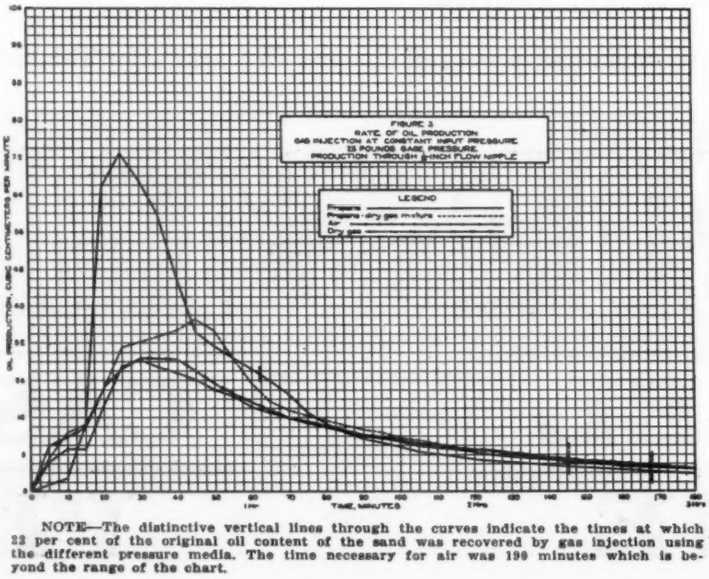
The relative efficiency of the pressure media may be further considered upon the basis of work done in recovering a definite quantity of oil. The amount of work done by each gas in recovering 22 per cent of the original content of the sand, additional to the 23.3 per cent recovered by "natural flow," also is given in Table 5. In the author's opinion, this furnishes a more comprehensive basis for comparison in that the effect of the solubility of the gas in the oil as well as the volume of gas used enters into the computation of the work done. For example, the work done by the propane-dry gas mixture was much less than that done by air for the nearly equal volumes used, because of the lower pressure differential through the sand caused by the continual solution and liberation of the propane-dry gas mixture as it passed into the sand and then toward lower pressure areas around the producing well. In a comparison between air and dry gas more energy was expended by the dry gas in recovering a given amount of oil than by the air, although dry gas was much more soluble than air. The reason for this was that more dry gas was required than air, and the additional dry gas necessary to recover the same amount of oil more than offset the advantage gained by the lower pressure differential of the dry gas.



Gas Injection at Constant Input Volumes

Data concerning the experiments in which the pressure media were injected at a constant input rate are presented in Figures 4 and 5 and Table 6. These data afford much the same interpretation as the data for the first general type of experiments. However, the resultant effect of the solubility of the various pressure media was more pronounced both in point of the rate of gas production, Figure 4, and the rate of oil production, Figure 5. During the early part of gas injection there was a decided lag in oil and gas production when propane was used, indicating that at first most of the propane was dissolved. The amount of lag for the gases used varied approximately as the fifth root of the solubility of the gas in the oil. As the run progressed and the oil moved toward the producing well the dissolved gas was released from solution, as evidenced by a gas production rate greater than the gas injection rate. It was further noticed in the air and dry gas experiments that the total volume of air and dry gas produced was greater than the total volume injected, which indicates "stripping" of the more volatile constituents of the oil. About the same amount of the propane-dry gas mixture was recovered as was injected, but more propane was injected than was recovered, indicating that there was an approximate balance between the volume of volatile fractions lost by the oil and the volume of propane-dry gas mixture that remained in solution, and that the volume of propane remaining in solution was greater than the volume of any volatile fractions lost by the oil. The tendency for a portion of the dissolved gas to remain in solution after the release of pressure has been noted by Mills and Heithecker[7]. The A.P.I. gravity determinations of the oil produced indicated the same trend. Both air and dry gas caused a loss in gravity of the oil. There was little change in the gravity of the oil when the propane-dry gas mixture was used and a gain in A.P.I. gravity of the oil when propane was used.

In both types of experiments the density of the pressure medium seemed to



NOTE—The distinctive vertical lines through the curves indicate the times at which 22 per cent of the original oil content of the sand was recovered by gas injection using the different pressure media. The time necessary for air was 190 minutes which is beyond the range of the chart.

[8]Cattell, R. A., and Rawlins, E. L., Flow of Gas Through Small Orifices Under High Differential Pressures: Tech. Paper, Bureau of Mines, in preparation. Rawlins, E. L., Flow of Gases Through Small Orifices: Proc. Southwestern Meter Short Course, 1928, Norman, Okla.; see also The Oil and Gas Journal, May 10, 1928, p. 111.

[7]Mills, R. Van A., and Heithecker, R. E., Volumetric and A.P.I. Gravity Changes Due to the Solution of Gas in Crude Oils: Repts. of Investigations, 2,893, Bureau of Mines, October, 1928, 15 pp.

be a factor influencing its efficiency as a propulsive agent in the recovery of oil. Due to the persistence of this indication helium was used in the second group of experiments because it was almost insoluble in oil and had a specific gravity much less than air. The result shows that the density of a gas does enhance its value as a pressure medium, but only slightly. This is shown a little more clearly in Table 6 than in Figure 5. Inasmuch as nearly all of the physical properties of the gases used varied with each gas it is difficult to decide upon the importance of the various factors that influence the efficiency of a gas in the propulsion of oil through sand. Unfortunately, the experiments give only the cumulative effect of all the variables.

Gas Injection Under Volume Control

Comparison of the data presented in Figures 2 and 3 and Table 5 with the data in Figures 4 and 5 and Table 6, respectively, brings out forcibly the value of input volume control in gas injection. These data indicate to some degree the comparative results that might be expected in the field with and without volume control. Volume control operations are more efficient from nearly every standpoint. With rates of gas injection as the basis of control, relatively high initial input volumes with a minimum danger of excessive gas slippage may be maintained while the sand is well saturated with oil. Later when the degree of saturation has been reduced by the removal of oil and the danger of gas slippage has increased the amount of gas slippage may be controlled by the volume of gas injected. Furthermore, during the later periods of gas injection there is not the tendency toward excessive gas slippage with a continuance of the controlled volume input that would be manifest with a continuance of the initial gas injection pressures. Maintenance of constant input pressure permits a wide variation in the velocity of gas flow through the sand which is not conducive to efficient operation. As the saturation of the sand decreases the resistance to the flow of gas decreases, resulting in higher gas injection rates with increased slippage, unless the gas injection pressure is changed from time to time to control the volume input and to compensate for the tendency toward increased injection rates. Judicious application of volume control will require the injection of less gas and should result in quicker recovery of the oil, lower total gas-oil ratios, lower average injection pressures, and consequently less work done to recover the oil than when the volume of input gas is not controlled.

Gas Injection With Back Pressure on Producing Well

The curves in Figure 6 give a comparison between the experiments in which a one-sixteenth inch flow nipple was used in the producing well and those in which a one-thirty-second inch flow nipple was used. The propane runs were chosen for the comparison because the difference in the results was most pronounced. Air showed the least difference, and the other pressure media showed differences in proportion to their solubility in the oil. Propane, being the most soluble of the gases used, caused the loss of the greatest amount of potential energy as a result of the increased back pressure of the smaller flow nipple. The energy stored in the oil in the form of dissolved gas was dissipated after the oil passed the flow nipple and did not aid in the work of moving the oil to the producing well other than effecting a decrease in the viscosity of the oil. Under the slightly increased back pressure when the one-thirty-second inch flow nipple was used less oil was recovered by using the same volume of propane as when the one-sixteenth inch flow nipple was used.

Although dissolved gas reduces the viscosity and surface tension of an oil[8] and thereby increases its mobility the above comparison indicates that the benefits derived from gas in solution are not of more importance than those which accrue through a complete utilization of the energy in the gas. Gas that will go into solution quickly may not have sufficient energy in the state of solution to free itself from solution when pressures are reduced. The ideal gas for gas injection is therefore one that will dissolve freely in the oil at the injection pressure and will be liberated from solution by the time it reaches the producing well. Since there is seldom a choice of gas for injection purposes the same conditions may be approached by control of operating pressures.

Summary

The experimental data presented in this report show that a number of factors affect the efficient recovery of oil from sands by the "gas drive." (1) The density of a pressure medium has some effect upon oil recovery with a "gas drive" because of the greater kinetic energy available in a denser medium. (2) Control of the injection rate is advantageous because by such control gas-oil ratios and energy expended may be reduced. (3) The solubility of a pressure medium is important not only because of a reduction of the viscosity and surface tension of the oil but also because of an increase in the volume of the oil due to the dissolved gas[9] which increases the saturation of the sand and therefore tends to reduce gas slippage. If the increase in the volume of the oil is not sufficient to fill the voids completely a further benefit may be derived from expansion of the gats from solution. Knowing the frothy consistency of oil with gas in the occluded state one may visualize a similar condition within the body of sand when gas expands from solution. As this condition probably can be brought about within the pore spaces of the sand its effect would be more complete filling of the interstices with an oil and gas mixture. This occupancy of the pore spaces would tend to prevent slippage of gas through the less saturated portions of the sand, and complete filling of the voids in this manner would reduce "by-passing." Under such conditions more of the piston effect would be introduced into the "gas drive" by giving the pressure medium a surface to work against. This explanation probably applies to instances in field operations where "by-passing" has been reduced by the use of "wet" gas.

TABLE 5—COMPARISON OF PROPULSIVE EFFECTS OF DIFFERENT GASES INJECTED AT CONSTANT PRESSURE*

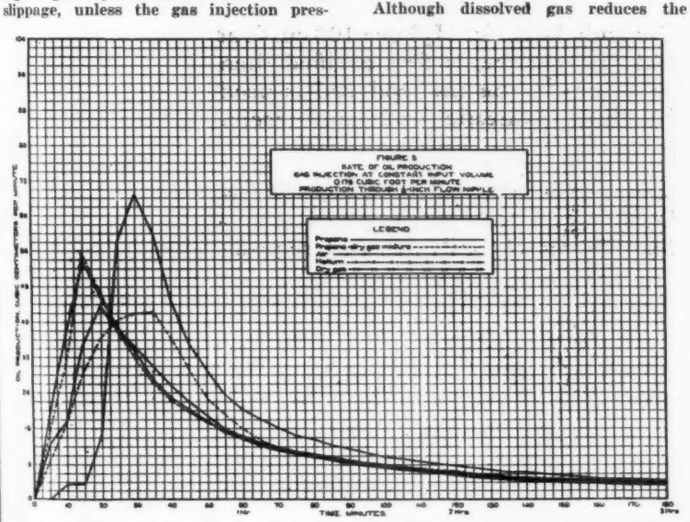
Pressure medium—	Specific gravity	Oil recovered "natural flow," per cent	Time interval to recover additional 22 per cent of oil by gas injection, minutes	Total volume of gas required to recover 22 per cent of oil by gas injection, cu. ft.	Total gas-oil ratio for gas injection	Mean flow—tube pressures, pounds gauge Input	Output	Work done to to recover 22 per cent of oil by gas injection, ft.-lbs.
Propane	1.523	23.3	62	15.431	1,067	25.0	5.8	21,124
Propane-dry gas mixture	1.000	23.2	146	37.758	2,610	25.0	5.3	54,302
Air	1.000	23.2	190	37.851	2,577	25.0	3.5	60,959
Dry gas	.690	23.4	168	44.269	3,060	25.0	4.7	66,167

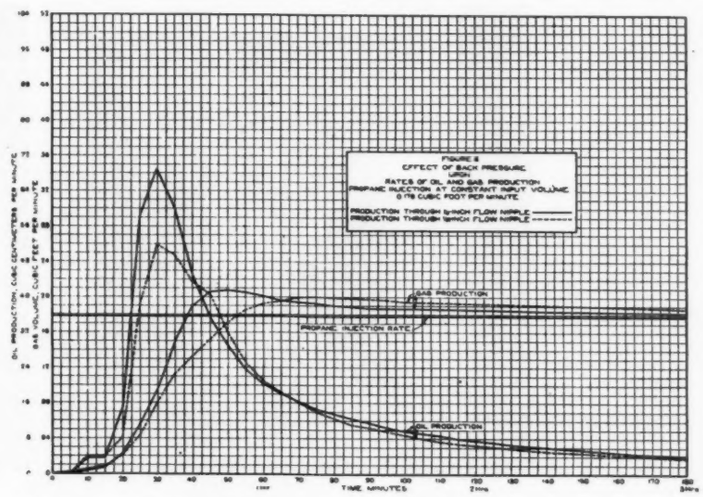
*The data in this table apply to a gas injection pressure of 25 pounds per square inch gauge. The oil and gas were produced through a one-sixteenth inch flow nipple.

TABLE 6—COMPARISON OF PROPULSIVE EFFECTS OF DIFFERENT GASES INJECTED AT CONSTANT RATE*

Pressure medium—	Specific gravity	Oil recovered "natural flow," per cent	Time interval to recover additional 22 per cent of oil by gas injection, minutes	Total volume of gas required to recover 22 per cent of oil by gas injection, cu. ft.	Total gas-oil ratio for gas injection	Mean flow—tube pressures, pounds gauge Input	Output	Work done to to recover 22 per cent of oil by gas injection, ft.-lbs.
Propane	1.523	23.2	96	17.088	1.181	17.78	3.13	20,400
Propane-dry gas mixture	1.000	23.2	132	23.496	1,624	19.97	3.04	32,800
Air	1.000	23.4	130	23.140	1,600	25.55	3.10	38,800
Helium	0.138	23.4	138	24.564	1,698	23.54	2.75	39,700
Dry gas	0.690	23.5	169	30.082	2,080	18.97	2.55	41,900

*The data in this table apply to a gas injection rate of 0.178 cubic feet per minute. The oil and gas were produced through a one-sixteenth-inch flow nipple.





Acknowledgments

Thanks are due L. E. Eldridge, Phillips Petroleum Co., Bartlesville, Okla., and C. E. Earle, naval representative, United States Helium Production Plant, for their co-operation in obtaining propane and helium for conducting the laboratory experiments. Acknowledgment is also made to H. R. Pierce, Dunn & Lewis, consulting engineer, Bureau of Mines, for his suggestions regarding the analysis of data.

The writers are indebted to H. C. Fowler, acting chief engineer, petroleum and natural gas division, Bureau of Mines; Ben E. Lindsly, senior petroleum engineer, Petroleum Experiment Station, Bureau of Mines, and H. C. Miller, senior petroleum engineer, Bureau of Mines, for criticizing the report and for their helpful suggestions and constructive criticisms.

The investigation was conducted under the supervision of H. C. Fowler, acting chief engineer, petroleum and natural gas division, Bureau of Mines, and N. A. C. Smith, superintendent of the Petroleum Experiment Station, Bureau of Mines, Bartlesville, Okla. H. M. Smith, associate petroleum chemist, supervised the gas analyses; E. C. Lane, assistant petroleum chemist, had charge of the oil analysis, and John Trevorrow supervised the drafting.

Special acknowledgment is made to the State of Oklahoma for the co-operative funds made available for this work.

[8]Dow, D. B., and Calkins, L. P.; Solubility and Effects of Natural Gas and Air in Crude Oil: Report of Investigations 2,732, Bureau of Mines, February, 1926. Beecher, C. E., and Parkhurst, I. P.; Effect of Dissolved Gas Upon the Viscosity and Surface Tension of Crude Oil: Petroleum Development and Technology in 1926, petroleum division, Am. Inst. Min. and Met. Eng., Pages 51-63.

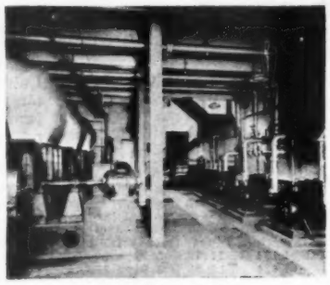
[9]Mills, R. Van A., and Heithecker, R. E.; Volumetric and A.P.I. Gravity Changes Due to the Solution of Gas in Crude Oils: Report of Investigations 2,893, Bureau of Mines, October, 1928, 15 pp.

VENEZUELAN OUTPUT

NEW YORK, Sept. 29.—August production of crude petroleum in Venezuela totaled 11,378,274 bbls., an average of 367,041 bbls. per day, as compared with 11,624,070 bbls., or 374,970 bbls. per day in the previous month, and 11,394,443 bbls., or 367,562 bbls. daily in August last year. Output for the first eight months of 1930 aggregated 90,443,131 bbls., an increase of 223,849 bbls. over the same period last year.

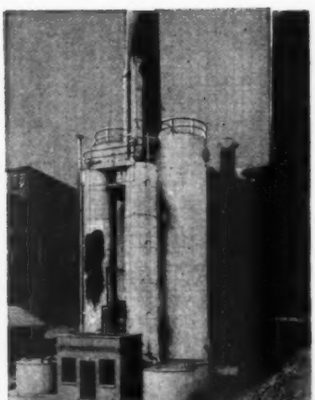
CHANGES NAMES AND MOVES

CHICAGO, Sept. 29.—The Keystone Oil & Manufacturing Co. has succeeded to the Keystone Oil & Manufacturing Division Central Commercial Co. The offices have been moved to 1036 West Division Street. All sales and similar business will be transacted at the new offices. Executive offices will be maintained in the McCormick Building in charge of Ward G. Pearl and Forest Lowry.



The Model Pump Room

A combination LIQUID PURIFICATION & DEHYDRATION PLANT



We illustrate at the left a new Koppers Liquid Purification and Dehydration plant, designed and built by "Western Gas".

Gas with 2000 Gr. H_2S per 100 cu. ft. at 40# gas pressure, is first purified then dehydrated. The gas produced is used for both domestic and commercial purposes.

Complete Literature covering "Dehydration" and "Koppers Liquid Purification Processes" available upon request.

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FORT WAYNE. IND.

"Western Gas" Designs and Builds

- A. B. C. Generator Grates
- Naphthalene and Gum Absorbers
- Condensing Apparatus
- Carburetted Water Gas Plants
- Blue Water Gas Plants
- Gas Dehydration Plants
- Holders (Gas, Oxygen, etc.)
- Liquid Purification Plants
- Oxide Boxes (Purifiers)
- Welded Steel Pipe
- Tower and Rotary Scrubbers
- Valves

High Pressure Natural Gas Transmission

Some Aspects Presented by the President of the Hope Engineering Company. Recent Improvements in Pipe and Welding

By R. S. Lord
President, Hope Engineering Co.

The growth of the natural gas industry to its present stable condition has not been without the difficulties that beset other lines of human endeavor.

Thus, when the original supply of gas from the Murrysville Field, approximately 20 miles east of Pittsburgh, Pa., began to show a serious drop in pressure, the problem of keeping up the supply to consumers in Pittsburgh was very carefully studied. George Westinghouse, then at the head of the principal distributing company, worked on the idea that the only way this supply could be kept up was by means of pipe lines of larger diameter to meet the lowering pressures. As a result of this, there are lines leading into Pittsburgh which have been in operation many years, having a diameter as large as 36 inches, in which the joints were made by riveted flanges. J. N. Pew, at that time the head of the Peoples Natural Gas Co. and later the father of the Sun Oil Co., believed that there should be some means of forcing the gas through the pipe lines. As a result of his conferences, the first successful natural gas compressor was developed at the plant of the Hall Steam Pump Co. at Pittsburgh. The plans for this original gas compressor were drawn by H. D. Hildebrand, now deceased, a former president of the organization which the writer represents.

The idea of drawing the gas from the partially depleted wells and compressing it to the original or other suitable pressure, for the purpose of forcing it through the lines as had formerly been done by the natural well pressure, is based upon engineering principles that are now thoroughly understood, but at that time the question presented some puzzling problems.

The compression of air was well known but gas is an inflammable substance that under certain conditions is explosive, and it was a known fact that certain gases could not be compressed safely except with the greatest care and such compression was done only with small quantities while the new problem required the compression of large volumes of gas at a rapid rate.

Suction Pressure

Another complication was due to the fact that the suction pressure, instead of being substantially uniform as in the case of air compressors, would be subject to variations of pressure due to operating conditions as to the number and pressure of the numerous wells that might be supplying a large line to an industrial center like Pittsburgh.

There is a certain ratio between the suction and discharge pressures of the compressor cylinder which gives the best balance between fluctuations of suction pressure, the discharge pressure remaining constant. This particular ratio should be used unless there are governing reasons to the contrary.

There is also a material fluctuation in the discharge pressure, due to the peak and off-peak conditions at the consuming end of the line which is not, except in rare cases, taken care of by gas holders or other storage as in the case of artificial gas manufactured near the point of consumption. With natural gas installations the line itself and the wells serve the purpose of storage in a different way.

These conditions have all been fully and satisfactorily met but when the call came for the first natural gas compressors, they were the subjects of greatly divergent opinions.

Early Use of Compressors

A story told of the early use of a compressing station, showing its effect, which at that time seemed rather surprising, is the following:

Two competing companies had wells rather close to the lease line on opposite sides of a stream. One company had a report from its field man of a very surprising situation. His pressure test had showed a higher pressure at a junction of a branch line with the main line than the same gauge showed on the well at the end of this branch line next to the stream mentioned. Considerable study was given to the reason for this peculiar situation, which was later explained when they learned that the new compressing station of the competitor actually worked and that gas was being drawn from their main line back through the branch line, down their well, under the stream and out through the well of the competitor. This was almost as surprising to some of those early gas men as it was to the people of Chicago when Lake Michigan began to empty into the Illinois River, on completion of the drainage canal.

The early natural gas compressors were belt driven by steam engines, which continued to be the practice for a number of years, but the development of the gas engine in this field has been such that at the present time nearly all of the natural gas compressors, except in some special cases, are driven by direct connected gas engines, using natural gas as the fuel. Two-cycle gas engines have been usd to a large extent where there was an excess of gas that did not have a market, but nearly all the modern gas compressing stations use four-cycle engines which, although more expensive, as to original cost, operate on a little more than half the quantity of fuel gas that a two-cycle engine uses.

These modern four-cycle, direct connected, gas engine driven gas compressors have been brought to a high state of efficiency and reliability and it is customary to run them day and night for months without stopping.

The initial pressure in natural gas wells in many cases runs as high as 1,500 pounds per square inch and even more, in exceptional cases. Some wells in the Turner Valley Field in Alberta, Canada, are estimated to have a pressure well above 2,000 pounds, but these wells have not yet been put fully under control and the exact closed-in pressure has not yet been determined.

Mud Everywhere But the Line Goes Through Just the Same

Natural Gas Lines

Some of the earlier developments of natural gas pipe lines were along the line of the use of cast iron, but it very soon developed that the ordinary cast iron did not meet the prevailing pressure conditions and also that the leakage by any known method of making joints was extremely large. It became necessary for the companies manufacturing steel pipe to expand their capacities and sizes very materially. At one time, in the early development, an 8-inch pipe line was considered about the limit, but they finally developed up to a maximum of 12-inch in a screwed line. Even at this point it was very difficult to make threaded joints with a reasonable assurance of tightness. At the time when the city of Gary, Ind., was being laid out and piped, our company, then new in gas engineering work, proposed to construct the piping systems. The specifications provided called for an extremely difficult test for screw pipe. We were perfectly able to meet this test by other methods of piping, which will be explained later, but questioned whether it would be possible to make screw joints up to 12-inch to meet the extreme conditions called for by the engineer in charge. We, therefore, took up the matter with a large manufacturer of pipe and received a reply stating that it was a mechanical impossibility to make threaded pipes in such sizes that would meet such conditions.

This condition, however, had already been met elsewhere in another way by use of plain end pipe and rubber sealed couplings. This was brought about by the invention of S. R. Dresser. It is true that other manufacturers had designed joints with somewhat similar ideas, even earlier than Mr. Dresser's, but credit must be given him for having put it into workable shape and having worked it. In order that it might be proven a success, Mr. Dresser built his own line near Malta, Ohio, I think in 1889, using the first Dresser couplings. Others have since manufactured couplings, for which they claimed credit for some advantages, but the idea of rubber-sealing prevails in all of them. The development of this method of piping had several marked advantages.

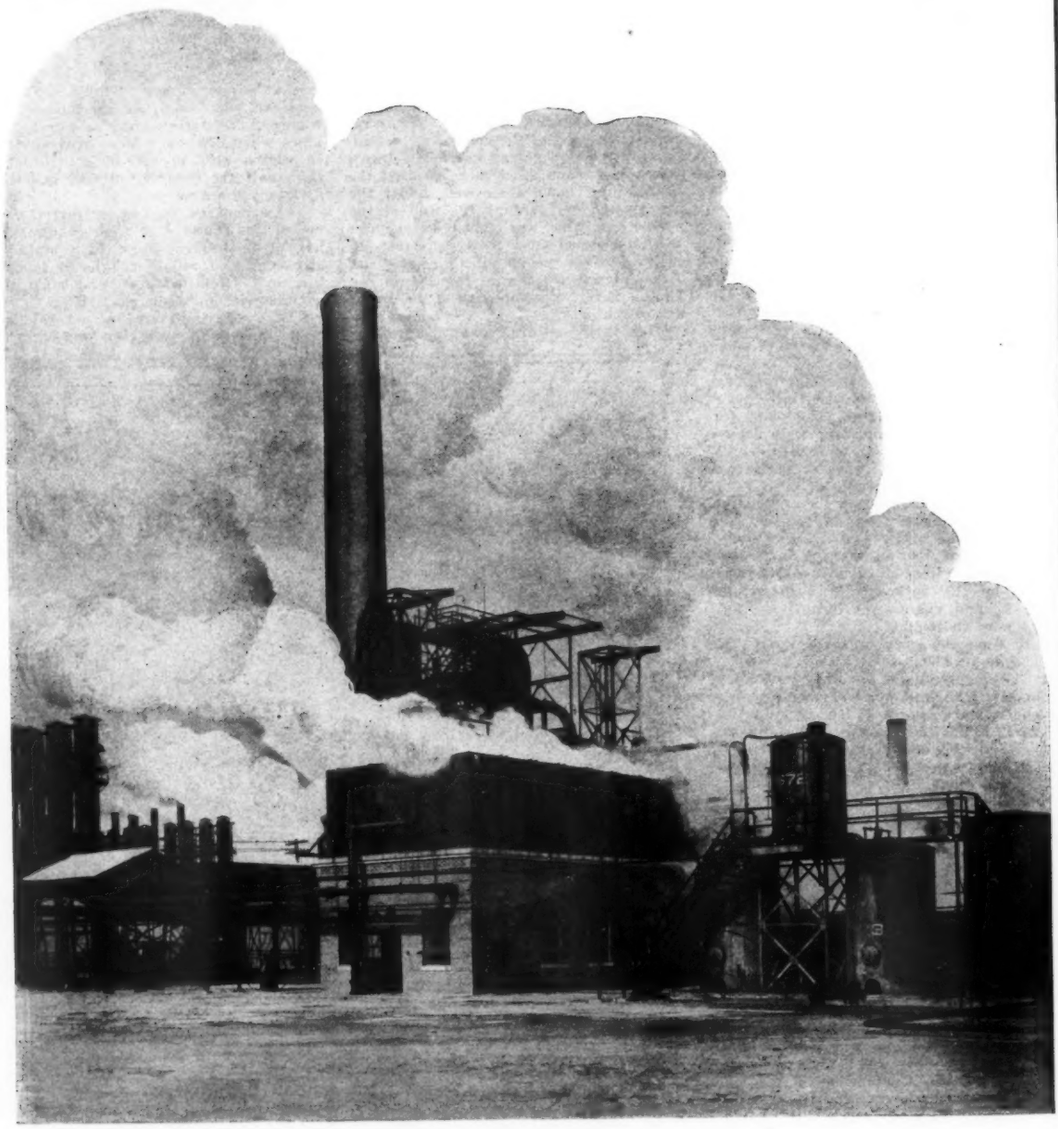
Advantages Cited

1. The joints could be made absolutely tight under any practical pressure; in fact, the writer has seen tests of line in which the pipe was entirely destroyed by excessive pressure without the couplings being either weakened or caused to leak.

2. The construction cost in labor of assembly was very greatly reduced and the speed of connecting up a line increased to the extent that records have been established of four (4) miles of 16-inch pipe being laid in one day by one operating crew. Naturally, this was under extremely favorable conditions, but it is usually expected that much more rapid progress will be made in laying coupled plain end line than by any other known method of connecting lines and when speed must be accomplished with successful and durable later operation, the rubber coupling has a marked advantage.

3. The plain end line has an advantage of flexibility, in as much as rubber joints permit it to meet the irregularities of ditch without extremely careful grading and permit bends up to 2 or 3 de-

EXPERIENCE



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Empire Oil & Refining Co.
Texas Pacific Coal & Oil Co.
Associated Oil Co.
Pennzoil Company
Independent Refining Co.
Gulf Refining Co.
Tidal Refining Co.
Continental Oil Co.
Anglo-Mexican Petroleum Co. Ltd.
Cities Service Refining Co.
Barnsdall Corporation
Beacon Oil Company
Pierce Petroleum Corp.
Magnolia Petroleum Co. of Texas
New Orleans Refining Co.
Skelly Oil Co.
General Petroleum Corp.
Shell Oil Company
Freedom Oil Works Co.
Vacuum Oil Company
Richfield Oil Co.
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SONS COMPANY

TULSA HOUSTON BOSTON

grees, even in large diameters, in some cases, much larger bends being used in small diameters.

4. Any repairs in the line or changes for connecting in branch lines could be more readily made with this style of joint than any other one, it being a frequent occurrence that gas is cut off, a new joint with a tee inserted and connection made without the line being out for a sufficient length of time to interfere with delivery at the terminus.

5. The cost of the line was very greatly decreased for the reason that the pipe itself need not be as thick as would be required for the same strength in a screwed line and it soon became the common practice to use a lighter weight line for gas work than was customary in oil lines where the screw line largely prevailed. The saving in material and the saving in cost of machine work and screwed couplings greatly exceed the cost of the rubber-sealed couplings. These rubber-sealed couplings have been used on lines as large in diameter as 54-inch, although not carried to extreme pressures in those large diameters. They have, however, been used in as large diameters and on as high pressures as are now in use on any natural gas pipe lines.

Welding Lines

After the invention of the acetylene welding equipment, there was a rapid turn to this method of joining pipe. However, it seemed for a time that this change was not justified on account of more or less faulty equipment and a still larger percentage of faulty workmanship. As a result of this, the welding of pipe lines suffered more or less of a relapse without entirely going out of fashion. Within the past few years, however, improvement in methods of welding, as well as in equipment for welding, have again increased the amount of welded line until at the present time it is much more popular than ever before.

Competent welders are very numerous now, but the fact still remains that there is in this method of construction a very large factor of the human element and while it is possible to produce 100 per cent welds, there is more probability of inferior joints in this method of connecting than in the old rubber-sealed lines. The best welder sometimes makes a mistake, the poor welder very frequently makes a poor job. We recently had a report from a prominent natural gas man, who told of his experience in welding a rather large pipe line. He stated that the welders were more temperamental than a prima donna and three times as many welders were employed as were needed on the work, one-third were coming, one-third were working and one-third were going. While all of this is true, there has, no doubt, been a marked improvement in welding lines and with certain limitations, dependent upon climatic conditions and diameters of pipe, the welding process will surely make good. There are methods of welding recently developed that have shown almost perfect record of successful joints, even in rather large diameter and there is no doubt in the writer's mind but what the improved methods will be so common that a still greater use of that method of joining lines will be the practice of the future. This does not mean that we are ready, as yet, to drop the rubber-sealed coupling. In the writer's opinion, it and the compressing station have been of more value than anything else in the record of natural gas transportation up to the present time. Improvements in pipe, which are already being made and improvements in welding, some of which have already been proven, will, no doubt, do a great deal for the future.

Recent Improvements

Among the recent improvements which have made good are pipes made by cold rolling steel plates and electrically welding the longitudinal seams. These pipes are usually made of comparatively high carbon steel, having a tensile strength much above the ordinary steel used in pipe that must be welded by the old method.

Among the new field welding methods is the one employing special electric welding equipment on bell and spigot shapes with a dam-like ridge on the spigot end so placed as to meet the overlapping bell and give added strength to the joint as well as some convenience in placing.

The further use of corrugated steel expansion members tends to relieve the strains of irregularly supported pipe and at the same time form a convenient method of making bends.

These improvements, mostly made by one manufacturer, are now rapidly being met by other makers. In fact, we understand that still greater tensile strength is in prospect. This will undoubtedly be brought about through the use of seamless tubing in sizes larger than is now made.

Some of our engineers, recently in Germany, report that in the large gas lines recently laid from the Ruhr Valley the joints are made by rolling a special corrugation at each end of the pipe in such shape that one end forms a bell and the other a spigot. After insertion, the bell is hammered or crimped in over the spigot ridge to form a lock which is then sealed by welding—either acetylene or electric.

This joint incorporates the expansion feature combined with some possibility of bend and the added value of the lock. These are ideas which in some form or other as proven most desirable, will surely be provided by all American manufacturers of pipe in the near future and they will, of course, tend to eliminate the hazards and increase the popularity of the solid welded lines. Up to the present, these welded lines have been compelled to meet a handicap of greater cost as well as difficulties of repairing when in service. The necessity for repair is ordinarily due to temperature changes, rather serious in the north, and strains due to irregular ground. Without some means of relieving these strains in sizes too large to give that serpentine wave which the pipe liner calls "slack," they are apt to give trouble in the first year's operation at least.

As against this the competing coupled line has a weakness due to its inherent flexibility which must be controlled by an ample weight of covering earth. A washout of considerable length causes trouble in the coupled line that would not be experienced in the welded line.

Flow of Fluids

The flow of fluids in channels and in tubes has been the subject of investigation for many years and various formulas have been devised to suit specific conditions. A natural gas pipe line has a great length compared to its diameter, the length of line without intermediate compressing stations sometimes being as high as 400,000 to 500,000 times its diameter, so that a formula which slightly under-rates the pipe friction or pressure drop might be sufficiently accurate for short lengths of piping with a small pressure drop but seriously in error for a line 100 miles long.

The formula used by the writer's organization for pipe line design and one that is recognized by most natural gas engineers as coming nearest to giving correct results, is the one proposed by Thomas R. Weymouth, now chairman of the board of the Oklahoma Natural Gas Co. In 1912, Mr. Weymouth read a paper before the American Society of Mechanical Engineers which was an elaborate and masterly mathematical analysis of the fundamental principles involved and which has become the classic of the engineering division of the natural gas industry. This paper was based partly upon some careful tests made a few years before by F. M. Towl on an actual pipe line in operation and the essential portions of Mr. Weymouth's paper are embodied in a chapter written jointly by Mr. Weymouth and Mr. Towl and included in Volume I of Day's Handbook of the Petroleum Industry, to which reference is made for the benefit of those who wish to follow further the detailed mathematical discussion of the subject.

Weymouth Formula

Weymouth's formula for the flow of gas in long pipe lines with large pressure drop for gas of 0.6 specific gravity and under conditions assumed to be average is:

$$Q = 37\sqrt{\frac{(P_1^2 - P_2^2)\ d\ 5\frac{1}{3}}{L}}$$

in which

Q=flow of gas, cubic feet per hour

P_1=absolute initial pressure, pounds per square inch

P_2=absolute terminal pressure, pounds per square inch

d=actual inside diameter of pipe in inches

L=length of line in miles

The factor 37 is subject to certain corrections for specific gravity and flowing temperature of gas, but for the purpose of this paper will be used as written above.

The writer has used this formula in the design of large pipe line systems and the performance of the lines has been in very satisfactory agreement with the calculated capacities.

In the earlier days of the industry, he has also used other formulas and found in certain large lines calculated upon a certain formula that the capacity was greater than predicted, although fairly accurate results had been reached in smaller lines, with this formula. In these particular cases it happened that due to subsequent developments this excess capacity was welcome but, of course, it is desirable nevertheless to have our calculations as nearly correct as possible.

The Bureau of Mines, in co-operation with the Natural Gas Department of the American Gas Association, has recently made some tests of the flow of natural gas in pipe lines and has made a preliminary report in which it is shown that the Weymouth formula comes nearer than any others to representing the conditions of flow, where the flow is uniform.

Capacity of Line

It will be noted upon inspection of the formula that, other conditions being equal, the capacity of the line is proportional to the square root of the $5\frac{1}{3}$ power of the pipe diameter rather than to the square root of the fifth power as is sometimes assumed and as is no doubt satisfactory for many purposes other than these very long slender pipe lines. The square root of the $5\frac{1}{3}$ power is equal to the 8/3 power or the cube root of the eighth power and the relationship is often thus expressed.

It will also be noted that the capacity is inversely proportional to the square root of the length of the line, which, of course, would not be true with an oil or water line in which there is a uniform resistance per unit of length. The pressure drop on the gas line is in the form of a parabola rather than a straight line which means that with certain combinations of quantities, lengths and pressures, the pressure which has been dropping off gradually along the line drops off very suddenly near the end. This is sometimes puzzling to men who are used to the uniform drop of the oil line pressure.

It will also be noted that the quantity is proportional to the square root of the difference of squares of the absolute initial and final pressures. Thus, if there is a field pressure of 400 pounds gauge, and a terminal pressure of 50 pounds gauge, which, on account of the fluctuations in a long line, is a desirable town border pressure, the square root of the difference of the squares of the absolute pressures would be 410 pounds, while if the field pressure were reduced through partial exhaustion of the wells to 100 pounds gauge, the square root of the difference of the squares would be 95, which is considerably less than one-fourth of 410. In fact, it is 410 divided by about 4.3, so that the quantity of gas that would go through the line would be divided by 4.3. Soon the gas pressure would fall so low that its flow would be insignificant.

This inevitable decline in the well pressure has been met in the manner already described by the development of the compressing station.

The successful completion of various large natural gas lines in the past few years has led to numerous irresponsible

Preparing Line for River Crossing

NO SUBSTITUTE

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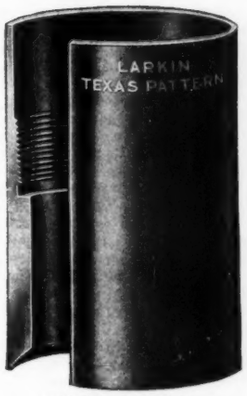
SWAGE NIPPLE



FORGED STEEL CASING SHOE

WIRE LINE PLUNGER SAND PUMP

BULL PLUG

FOUR-IN-ONE PACKER

SPIDER WITH SLIPS

CASING CLAMP

COMPANY

MISSOURI

OKLAHOMA CITY

attempts at promotion of other large lines by people who are in no way qualified to carry out a proposition of this kind. P. M. Biddison, in a valuable paper read in May, 1928, before the Natural Gas Department of the American Gas Association, made the comment that "'we have seen promoters who had no gas, no contracts for gas, no money, no financial connections and no knowledge of the gas business, glibly quote rates and secure franchises in communities hundreds of miles from any gas fields at rates which we have been accustomed in the past to associate with communities adjacent to natural gas fields, thus creating an expectancy of rates in the public mind that could never be realized."

These promotions, however, while harmful in their effect upon the public mind, could not stand the light of proper engineering analysis and consequently have not gone very far. Those that have actually been built have been amply financed after competent engineering investigation.

Determining Feasibility

The feasibility of a natural gas proposition is capable of engineering analysis and with proper allowance for uncertainties which necessarily exist in projects of this kind, it can be determined whether a given proposition is a reasonable and proper basis for the investment of money or merely an idle dream of the type of promoter previously mentioned. This allowance for uncertainties, in order to be of value, must be based upon judgment founded upon experience in this line of work. Many cases occupy an intermediate position and while they cannot be considered conservative, they can not be condemned as entirely unworthy of consideration. It may be that the possibility of large reward justifies a risk that could not be considered conservative, but those who take the risk are entitled to know what they are doing.

There are means of determining, within a reasonable degree of accuracy, the probable natural gas consumption in a given community that is under consideration. The term "domestic load" is used in natural gas engineering to include house heating, instead of being limited to cooking and hot water heating, as the writer understands is the custom with manufactured gas. The calculation of the domestic load used in the natural gas sense is based upon the assumption that nearly everybody will use the natural gas for cooking and water heating, while the extent to which it will displace coal or oil for house heating depends partly upon the ratio of the price of those fuels to the price for which natural gas can be furnished. Some will use the natural gas at any price that is normally charged for it, as is evidenced by the fact that they thus use manufactured gas of half the heating value and twice the price.

Gas a Fuel Competitor

On account of the convenience of use, and the entire absence of dirt and ashes, nearly everybody will use natural gas for house heating if the price can be made low enough to approach equality, on a heat unit basis, the price of coal at the particular community under consideration. The problem is quite different in different places, depending upon the proximity of coal mines and the character of the coal and keeping in mind that coal prices will probably be reduced upon the advent of natural gas.

Often the conditions are such that natural gas can not be profitably furnished at a price actually to compete with coal strictly on a heat unit basis, but a large proportion of the possible house heating load will be secured on the basis of convenience and cleanliness. Just what proportion is one of the problems to be solved and it will depend largely on the ability and willingness of the prospective customers to pay a little extra for convenience and cleanliness. This problem, as is well known, has been studied in minute detail for manufactured gas, but manufactured gas can not hope to come anywhere near completely displacing coal for this purpose, as natural gas sometimes can and does.

Assuming that the price can be set so as to get nearly all of the available house-heating business, in competition with coal, it has been found possible to make a reasonable prediction of the house heating load by means of the "degree-day method" which the natural gas man has appropriated from his manufactured gas brethren and which has been so ably set forth in the House Heating Bulletin of the American Gas Association, to which reference is made for detailed information on the subject.

The adoption of this method for use with natural gas has resulted in the determination of coefficients for different parts of the country. Thus, the quantity of natural gas used for house heating has been determined for Dallas, Tex., at about 16 feet per consumer per degree-day deficiency, while our investigations in several Montana cities shows a consumption of about 30 feet per degree-day deficiency. This seems excessive, however, and we have reached the conclusion that this probably will be reduced to 20 to 25 feet, with the advent of more efficient appliances and the more general protection of the houses in those cold climates by the use of storm doors, double windows, weather stripping, etc.

Industrial Loads

For determining the industrial load to be expected in any particular community, we make a comparison with the past consumption of coal, oil, manufactured gas and other fuels, making due allowance, as far as we can, for the different efficiencies of burning the fuels. In many cases, however, we are able, from records that we have, to apply very accurate data to the particular processes, without the necessity of estimating or guessing at the respective efficiencies of the different fuels.

The following are a few items quoted from a recent report by one of our men:

"Thermostatic control and uniformity of heating are the outstanding features of these installations. Definite schedules can be followed by inexperienced men and results duplicated. The natural gas equivalent in cubic feet per unit of product is shown below for several industries:

Sand drying, cu. ft. per lb.	0.08
Locomotive tire heating, cu. ft. per tire	100.0
Heating rivets, cu. ft. per lb.	2.0 to 2.5
Heating preliminary to forging, cu. ft. per lb.	2.5
Drop forging, cu. ft. per lb.	2.5
Hardening and tempering springs, cu. ft. per lb.	4.69
Annealing die blocks and miscellaneous forging, cu. ft. per lb.	1.32
Normalizing motor truck parts, cu. ft. per lb.	1.0
Annealing brass, cu. ft. per lb.	0.4
Melting tin bronze, cu. ft. per lb.	2.19
Annealing glass bottles, cu. ft. per lb.	0.25

"Kentucky fire clay burned to cone No. 8 takes approximately 15,000 cubic feet of natural gas per 1,000 9-inch brick.

"Ohio clay burned to cone No. 3 takes approximately 10,500 cubic feet of natural gas per 1,000 building brick.

"West Virginia shale burned to cone No. .02 takes 8,500 cubic feet of natural gas per 1,000 building brick.

"The above information is based on results obtained on round down-draft kilns.

"Ohio clay (fire) burned to cone No. 3 in a tunnel kiln takes about 3,300 cubic feet of natural gas per ton of ware."

The writer has not personally checked up the exact conditions under which these particular determinations were made and can not say, offhand, whether they are high or low, but they are given to show that the engineering investigation of natural gas projects bears no relation to the guesses made by the type of promoters who have brought more or less suspicion upon some such propositions.

In addition to determining that a certain market is available for a natural gas project, it is essential that the gas be available to supply the market for at least a long enough period to make it worth while for the prospective consumers to change from the fuel they have been using, and to permit the amortization of the necessary investment, with a satisfactory return on the capital while it is invested.

New Projects

New natural gas projects are based upon actual gas fields that have already been discovered, usually in the search for oil.

These gas fields are subject to actual physical tests, not dependent entirely upon geological evidence. Thus, their gauge pressure can be taken which indicates the degree to which the gas is compressed in the available pore space, and also the propulsive power to assist in getting the gas to the market. Then, their open-flow can be taken, which means the measurement by pitot tube of the quantity of gas that a well can send forth into the atmosphere against atmospheric pressure. The thickness of the "pay" sand can be determined from the well logs, the porosity of the pay sand can be estimated from previous experience, and the extent to which a given field is proven can be determined from time to time as additional wells are drilled. Such engineering data, supplemented by geological evidence, makes it possible to estimate the volume and life of a gas field and there is no reason why such an estimate should not be safe.

Further developments may show the field to be enormously greater than estimated, but there is no reason to doubt the probable correctness of the minimum estimate, if made upon proper evidence and with proper discretion.

The connecting link between the field and the market is the pipe line, various aspects of which have already been referred to and some further details of which will now be touched upon.

In National Pipe Standards, the handbook of the National Tube Co., edition of 1924, page 299, it is stated that "the average ultimate tensile strength of pipe steel is 57,000 pounds per square inch, whether taken in the direction of rolling or transversely thereto" and that the efficiency of the lap-welded seam is 92 per cent. With a factor of safety of five, these figures would give a working stress of nearly 10,500 pounds for the unit stress for lap-welded steel pipe made according to the practice of the pipe mills that has been standard for many years. The steel used in the manufacture of this pipe is relatively soft, having a carbon content of about .07 to .10 of 1 per cent.

Improvements in Pipe

Reference has already been made to certain improvements in pipe leading to higher tensile strength. The developments of the past two or three years include the electrically welded longitudinal seams in pipes of large diameters as well as the more recent application of another manufacturer of electrically welded seams in small diameters. These two processes of welding are not alike but both methods produce a seam of 100 per cent strength as shown by exhaustive tests in laboratory and field.

With this electrically welded pipe, a higher carbon content steel can be used and the steel that is actually used has a carbon content of about 0.25 of 1 per cent. It has been satisfactorily determined that a unit stress of 13,500 pounds per square inch can be used with this pipe, with the same factor of safety as 10,500 pounds with the old style pipe. The writer's organization was the first to use this pipe and laid approximately 300 miles of it in 22-inch, 18-inch and 16-inch sizes in Texas.

Significant Event

During the progress of the negotiations for the financing of this work, the manufacturers proceeded to make the pipe and immediately upon completion of the financing, they made an initial shipment of three train loads, aggregating 123 cars, containing 15 miles of 22-inch pipe. These three trains were drawn up in the railroad yards and photographed as representing a significant event in the industry.

The following day a still larger shipment was made, totaling in the two days nearly 300 carloads or over 30 miles of 22-inch pipe. This was followed by daily shipments of about 40 carloads. Naturally, it was some problem to keep this rush of pipe moving out to the line and into the ditch which must be provided for it.

Since that time, some 3,000 miles of this type of pipe have been laid, by various oil and gas companies, in sizes ranging from 8-inch to 22-inch.

In addition to the advantage of higher tensile strength, it is feasible to make this pipe commercially in uniform lengths of 30 feet, or even 40 feet, instead of in random lengths of 18 to 20 feet, so that not only is the number of joints decreased, but the exact number can be determined in advance, which is an important item in shipping couplings to numerous points and distributing along the line.

The question of low carbon steel pipe, made by the old process, with a unit working strength of 10,500 pounds per square inch versus relatively high carbon steel pipe with electrically welded longitudinal seam and a unit working strength of 13,500 pounds, is therefore in a transition stage, with the indications that the latter will win the day for the larger lines while the older process may possibly continue to be used for smaller pipe with no definite prediction as to where the line will be drawn.

The maximum operating pressure of a natural gas pipe line, from an economic standpoint is dependent upon a number of elements, but before discussing any of these elements it can be said that a gauge pressure of 400 pounds per square inch has been generally recognized in the industry as an economic maximum.

Economic Pressure

The pressures used in oil pipe lines are ordinarily about 600 to 800 pounds per square inch and, as is well known, some modern steam central stations are operated at considerably higher pressures than this. Some people have thought that by analogy, higher pressures should be used in natural gas pipe lines. The reasons upon which the economic pressure depends, however, are quite different, as

(Continued on Page 412)

Natural Gas Pipe Line Compressor Station

Petroleum Exposition Is a Real School

Visitors Will Return Home With Freshened Interest in the Industry and Quickened Admiration for Men Who Make Equipment

Descriptions of exhibits received too late for inclusion in this list will be found elsewhere in this issue. Please see Index for page number.

Visitors to the International Petroleum Exposition in Tulsa this year will return to their homes with freshened interest in the oil and gas industry and with quickened admiration for the men who devote time, thought and labor to the invention and manufacture of appliances for use in its various branches. From year to year conditions in the industry change. New problems arise. The practice of drilling to deeper and yet deeper horizons imposes new demands upon the maker of drilling and pumping equipment. The need for the most accurate methods possible in the quest for new oil areas spurs the maker of geophysical instruments to still more searching experiment and study. The petroleum engineer discards old ways for better ones, with resultant requirement for new or remodeled equipment. In every branch—finding, producing, refining, transporting, marketing—each day sees the need of new or refashioned instruments for performing new tasks.

How well the inventor and the manufacturer have met the challenge is shown in a most interesting way by the thousands of pieces of equipment on exhibition at the exposition opening, October 4, and closing, October 11. A large proportion of the tools and machines are either entirely new or embody vital improvements over previous types. Every oil man—executive or employe—will go back to his job with broadened vision and a better grasp of his individual problems after visiting the oil show and studying the displays from all parts of the country collected there.

Much machinery is shown in operation. In many cases working models are shown. Representatives of the 360 manufacturing companies are at hand to explain their products. Here is a real school in the technique of petroleum.

Following are the principal exhibitors, with brief descriptions of their displays:

AMERICAN CABLE CO.
97, 98 Texas Building

The American Cable Co., Bridgeport, Conn., and the Page Steel & Wire Co., New York, are exhibiting jointly. The American Cable Co. display consists of various cables useful in the oil industries together with fittings, etc., and a section of bridge cable will be featured. The Page Steel & Wire Co. exhibits various types of Page fence including the new aluminum fence and also an exhibit of Page welding wire.

Aside from its educational features, the display is worked up in an attractive color scheme.

ATLAS SUPPLY CO.
Lot K, Open-air Space

The Atlas Supply Co., Muskogee, Okla., is showing in operation Weber two-cycle oil engines, including the 80 horsepower connected by short-belt drive to 4½x12 Union duplex oil line power pump; the Weber two-cycle 30 horsepower twin oil engine, and the Weber 40 horsepower two-cycle gas engine.

There also are displays of the American Cable Co.'s wire rope, both in Trulay and Crescent brands; the Belmont Packing Co.'s packings for all branches of the industry; Strong, Carlisle & Hammond Co.'s traps and separators for water, oil and gasoline, and the Boston Woven Hose & Rubber Co.'s mechanical rubber goods.

The following men represent the company at the booth: J. M. McLain, H. U. Everett, A. D. Larson, J. H. White, S. C. Maples and R. E. Howe.

AMERICAN BRASS CO.
108, 109 Oklahoma Building

The exhibit of the American Brass Co., New York, consists of a full line of copper brass, bronze, nickel silver and special copper alloys in all forms of sheets, wire, rods, tubes, die-pressed parts, extruded shapes, etc.

An outstanding feature of the display is an exhibition of oxy-acetylene welding with Tobin bronze filler rods. Because of the low welding temperature required (1,650° C.), preheating is usually not required when welding with Tobin bronze, the parent metal being heated to a dull red only. In this way, many repair welds can be made in place without the expense of dismantling and reassembling. Anaconda condenser tubes and Everdur metal, a copper alloy possessing the strength of steel combined with great resistance to rust and general corrosion is also prominently featured.

AMERICAN-LA FRANCE & FOAMITE CORP.
95, 96 Texas Building

The American-LaFrance & Foamite Corp., Elmira, N. Y., is exhibiting a complete line of fire-fighting and fire-protection equipment and fire department supplies.

Foamite Wideway engine.

Among fire protection devices exhibited is the company's line of Foamite extinguishers, 40-gallon Foamite engines, Foamite tanks for motor fire apparatus and several different sizes of Foamite generators for producing a continuous stream of Firefoam.

Soda-acid hand extinguishers, engines and tanks are also on display, as are the several sizes of carbontetracloride "fire guns" made by the company.

Among fire department supplies displayed are samples of fire hose, LaFrance electric lanterns, shut-off nozzles of various types, gas masks, inhalators, respirators, and other miscellaneous equipment.

THE AUTOCAR CO.
Open-Air Space

The Autocar Co., Ardmore, Pa., is exhibiting a heavy duty Autocar chassis especially designed and equipped for oil country use. It has also an interesting supplementary exhibit of Autocar material and manufacturing methods. The company is represented by R. M. Adams, H. M. Coale, C. Eustace Dwyer, J. W. Green, C. E. Gough, H. B. MacRae, F. H. Pietsch and E. D. Sirrine.

THE ALLSTEEL PRODUCTS MANUFACTURING CO.
Lot F, Open-Air Space

The following equipment is displayed by the Allsteel Products Manufacturing Co., Wichita, Kans.: Model 60 Cardwell Allsteel oil field winch, Model SA-30 oil field winch, Model FA-15 oil field winch, Model 60 pipe line and industrial winch, Model 20 backfiller and industrial hoist, and Model 20 core drill slush pump.

Each of these units is mounted on a Caterpillar tractor of model number corresponding to the model number of the Allsteel equipment. The pipe line unit and backfiller are new and have not been exhibited before.

Representatives present include H. W. Cardwell, president; H. R. Laudermilk, vice president; L. R. Austin, sales manager; William Guier, chief engineer, and Harley Reece, service representative.

ALLIS-CHALMERS MANUFACTURING CO.
Open-air Space

Allis-Chalmers Manufacturing Co., of Milwaukee, Wis., occupies tent space near the main entrance, exhibiting the new Allis-Chalmers No. 11 Oil Well Unit complete with motor, having the following features: 7-inch main shaft, interchangeable bearings, universal rails for any motor of 600 to 1,200 r.p.m.; post brakes, shock-absorbing Texrope drive to give any number of pumping strokes, crank balance or flywheel effect optional; automatic lubrication, and choice of housing arrangements; new explosion-proof motors with open motor mounting dimensions in most ratings and approved by underwriters; centrifugal pumping units suitable for oil industry service. An Allis-Chalmers single reduction Texrope unit with 150 horsepower Allis-Chalmers oil field motor is shown by International Derrick & Equipment Co.

The exhibit is in charge of D. M. McCargar, manager; R. A. Seymoure and C. M. Starkey of Allis-Chalmers Tulsa office, and other Allis-Chalmers oil field representatives.

The Monarch Tractors division of the Allis-Chalmers Manufacturing Co., Springfield, Ill., shows a complete line of oil-field equipment on its Monarch and Ind"U"strial tractors. The Monarch tractor is built in three sizes, "35," "50" and "75," and the Ind"U"strial tractor, which is being used extensively on industrial applications, is a 19-30 tractor; that is, 19 horsepower drawbar and 30 horsepower belt, S.A.E. rating.

Oil-field winches and pipe-laying booms are shown with the tractors.

W. Ellzey Brown, sales supervisor, is in charge of the exhibit.

AMERICAN SAND-BANUM CO., INC.
43 California Building

The American Sand-Banum Co., New York, is exhibiting and demonstrating Sand-Banum, a scale eliminant. This product, a development of 11 years of research in colloidal chemistry and practical field tests, is said to eliminate all old scale and to prevent formation of new scale in any kind of water. No analysis of water is needed since Sand-Banum acts mechanically, not chemically. An application once to four times a month is said to be all that is necessary. The product is highly concentrated, and is sold in pint cans, one of which treats 250 horsepower for one month.

In charge of the exhibit are C. S. Krafft, general manager of the Rooney-Krafft Co., Tulsa representative of the American Sand-Banum Co., and Edwin L. Hawkins, Texas representative of the Rooney-Krafft Co.

ARMSTRONG MACHINE WORKS
125 Texas Building

The feature of the Armstrong steam trap exhibit is a glass bodied three-fourths inch trap operating at 5 pounds working steam pressure. With this glass model it is possible to demonstrate how the Armstrong inverted bucket trap can handle air and dirt as well as condensate. In addition to the glass demonstrator, a complete line of cast iron and forged steel traps is on display. The exhibit is in charge of George B. Allan, Texas and Oklahoma representative of the Armstrong Machine Works, Three Rivers, Mich., and T. H. Rea from the Armstrong factory.

AHLBERG BEARING CO.
17, 18 California Building

Antifriction bearings, as employed in the oil field, form the basis of an interesting display by the Ahlberg Bearing Co., Chicago, featuring "CJB" master ball bearings and the Ahlberg ground bearing, a replacement bearing. The following representatives of the Ahlberg Bearing Co. are on hand: C. J. Bender, president; F. O. Burkholder, vice president and general sales manager; R. H. Kelly, district sales manager, and W. O. Gaffney, manager Osage Bearing Co., Tulsa distributor.

APPLETON ELECTRIC CO.
10 Oklahoma Building

The Appleton Electric Co., Chicago, manufacturer of threaded and no-thread mallaeable Unilets, also portable and constant duty Reelites, is exhibiting a line

of floodlights recently acquired from the National Appliance Co., division of the Reynolds-Spring Co., Jackson, Mich.

These floodlights, the most popular being the DR-130 which is illustrated, have been developed to conform with the requirements of different types of service. They meet more than one requirement by changing the type of reflector, lens or lamp. They are designed to give the maximum amount of light according to the type of lamp used, and as fewer projectors are needed when the proper installation is made this cuts down the installation, maintenance and operating costs.

Careful consideration has been given to the design of the interlocking lens ring which is weatherproof, water and dust tight. They are made for heavy-duty service, yet are light in weight.

A scientific radiating chamber with ample radiating surface permits suitable temperature continually to eliminate the necessity of ventilation.

ALLEGHENY STEEL CO.
10 Oklahoma Building

The Allegheny Steel Co. of Brackenridge, Pa., makers of the chrome-nickel alloy, Allegheny metal, will display a complete line of its products as these are used in the petroleum industry.

The display will show Allegheny metal, ascaloy 33, 44, 55 and 66, comprising the entire range of chrome-nickel and chromium alloys as manufactured under the American Stainless Steel Co. patent and the Krupp patent now controlled by the Foundation Chemical Co.

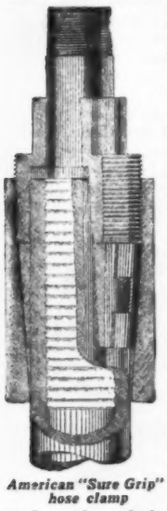
These various alloys have high resistance to erosion, corrosion, abrasion and high temperature, including the property of maintaining relatively high tensiles at elevated temperatures. The most popular application has been in the refining department for such items as cracking still tubes, lining of vessels, bubble caps and trays, heat exchange

tubes, condenser tubes, headers, preheaters, air heaters, etc. By controlling the carbon content in the Allegheny metal, the 18 and 8 alloy, the manufacturers claim the elimination of carburization at all temperatures up to approximately 1,725°. Hydrogen sulphide and salt water is said to have little or no effect on Allegheny metal.

The group of alloys have varying resistances to scaling from temperatures. Ascaloy 33 is said to have resistance up to 1,500°, Allegheny metal and ascaloy 66 up to 1,650° and 1,700°, ascaloy 44 up to 2,100° and ascaloy 55 up to 2,150°.

AMERICAN IRON & MACHINE WORKS CO.
61, 62 California Building

The American Iron & Machine Works Co., Oklahoma City, is showing its "Sure Grip" hose clamp, releasing and circulating spear, rock bit vise and all-steel adjustable steel rig brace.



American "Sure Grip" hose clamp

In the "Sure Grip" hose clamp the slips work on a tapered seat in the bowl. The more pressure put on the hose, the tighter the slips grip. The nozzle is constructed with a shoulder that pushes down on the slips, making them grip more firmly when the head is screwed down in the bowl. This shoulder also prevents the nozzle from being blown out of the hose.

The releasing and circulating spear is set with releasing nut well up in the top of the slip. This allows the gripping teeth section of the slip to rest on the mandrel. In this position an upward pull on the spear spreads the gripping segments of the slip to a positive hold on the casing.

The American rock bit vise is said by the manufacturer to save time and prevent injuries, as well as damage to bits when preparing them to be dressed.

The all-steel American adjustable steel rig brace can be adjusted in a few minutes with one set of chain tongs. It pushes down or pulls up on the derrick floor or engine foundation as desired. Vibration of the rig is avoided by prompt adjustment. The braces have 12 inches of adjusting space.

The American Iron & Machine Works Co. has become widely known through its practice of producing special equipment in times of emergency. The appliances for taming "Wild Mary Sudik" and the wild Sigmon well in the Oklahoma City Field were specially prepared by this company.

In charge of the exhibit is Earl Miller, vice president, assisted by J. F. Cailloux, president, and H. M. Myracle, secretary and treasurer, with the following: John R. Riley, Seth W. Smith, Harry J. Byers, Ed Hinton, R. J. Morgan, G. C. (Red) Ross, George S. Hinkle, P. K. Ridge, D. M. Gahagan, E. W. Herring and Bob F. Phillips.

AMERICAN FOMON CO.
44, 45 Oklahoma Building

The American Fomon Co., Philadelphia, Pa., is exhibiting portable foam equipment for the protection of all kinds of oil hazards. The exhibit features the equipment necessary for the protection of 55,000 and 80,000-bbl. oil storage tanks.

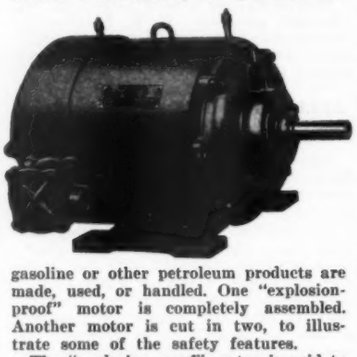
AIR REDUCTION SALES CO.
33, 34 Oklahoma Building

The Air Reduction Sales Co., New York, is featuring working demonstrations of three of its line of motor-driven oxyacetylene cutting machines, the No. 1B Oxygraph, No. 1A Radiagraph, and the No. 4 Camograph. Exhibits of Airco oxygen, Airco acetylene and the complete line of Airco-D-B hand welding and cutting apparatus are on display and actual pipe welding and hard-surfacing operations are conducted.

Representatives in attendance are P. S. Julian, R. W. Reeves, R. R. Thompson, O. F. Wilkinson, W. R. Ost and G. Van Alstyne.

THE LOUIS ALLIS CO.
44 California Building

The Louis Allis Co., Milwaukee, Wis., is exhibiting its "explosion-proof" motors which have been approved by Underwriters' Laboratories, for use wherever



gasoline or other petroleum products are made, used, or handled. One "explosion-proof" motor is completely assembled. Another motor is cut in two, to illustrate some of the safety features.

The "explosion-proof" motor is said to eliminate the need of fire walls, reduce insurance rates, increase plant safety, and bring to the petroleum industry a small, safe direct-motor drive for operation in explosive atmospheres in refineries, natural gasoline plants, and bulk stations. This motor is now built in sizes ranging from one-quarter to 100 horsepower.

A point stressed in the exhibit is the subject of safety as pertaining to the use of electric motors in explosive atmospheres in the petroleum industry. The booth is in charge of L. F. Keely and E. L. LeNoir.

ADVANCE RUMELY CO.
Lot B, Open-air Space

The new Rumely DoAll industrial winch tractor and Rumely DoAll stationary winch, which are being featured by Fred E. Cooper, special oil field representative of the Advance Rumely Co., Wichita, Kans., are a smaller machine than the OilPull winch tractor and OilPull stationary winch which have been exhibited at former shows. They are designed to handle wells up to 2,500 feet in depth easily, ruggedly built, simple in construc-

tion and compact. They are said by the manufacturer to be economical in operation, having four speeds of line travel forward, giving great lifting power and unusually high speed of line travel. The accompanying illustration shows one of the units mounted on a truck.

The OilPull winch tractor and OilPull stationary winch, which Mr. Cooper has exhibited at previous expositions, are shown this year also.

In charge of the exhibit are Mr. Cooper, A. G. Bailey, E. L. Kirkpatrick, W. A. Thomas, Jess Cooper, Harry Vance and John Province.

AMERICAN ROLLING MILL CO.
114, 115 Oklahoma Building

The American Rolling Mill Co., Middletown, Ohio, has a complete display of Armco spiral-welded pipe, supplemented by photographs of actual installations of sheets and plates in the oil and gas industry. The booth is shared with the Sheffield Steel Corp. of Kansas City, Mo.

BAASH-ROSS TOOL CO.
41, 42 California Bldg.

The Baash-Ross Tool Co., Los Angeles, Calif., is exhibiting its full line of oil field specialties, introducing several new articles of equipment, among which are the new combination blowout preventer and tubing head, safety joints, rake-tooth bits, mud screens, etc.

The combination blowout preventer and tubing head has been developed to meet the most severe condition of the wildest well. It serves as a blowout preventer while drilling, and an efficient tubing head upon completion of the well.

Another item of interest is the new improved pumping unit. The company is now manufacturing a line of individual pumping units for any well up to approximately 4,500 feet in depth. It runs and demonstrates the new unit at the show.

The following Baash-Ross equipment also is displayed: Roller bearing kelly bushing, H.&W. slips, perforating machine, tubing protectors (samples), drill pipe protectors, LeFlore cementing shoe guide, upset drill stem, pump jack, rotary jar, sheaves for crown and traveling blocks (bearing assembly), taps, packing overshot, spears, trip, drill pipe and casing cutters, holding tool, Hosmer tubing head, LeFlore float collar, B.&M. liner setter adapter, marble shoe guide, upset joint, wire rope, J.&L. casing, Star and Long Knife perforators, rig, hi-deck and traveling block.

A. V. Cox of the Oklahoma City shop is in charge of the exhibit, assisted by George Dewdney, manager of the Oklahoma City shop, and C. E. Lewis, Perry Pond and Eugene Turner, members of the Oklahoma City sales department. The following executives of the Baash-Ross Tool Co. are present: L. J. Baash, president; Erwin Burns, assistant general manager; H.H. Clark, vice president, and R. T. Watkins, head office sales.

BROWN INSTRUMENT CO.
39, 40 Scientific and Technical Building

The Brown Instrument Co., Philadelphia, Pa., is displaying a comprehensive line of modern instrument equipment for oil production and refining process controls. The central feature is Brown automatic controls for governing temperatures, pressures and flows in stills, towers and all along the line, liquid levels in towers, pump speeds, etc. A new development in this line is the Brown 801 automatic control indicator. In the recording control instruments a feature is the Brown "trend-analyzing" control recorder, an ingenious instrument for very close control.

Other items of the Brown exhibit are flow meters for measuring and controlling oil, gasoline, gas, steam, water, air, etc.; liquid level gauges for measuring and controlling the level of petroleum and petroleum products in tanks, towers, etc.; pyrometers for measuring and controlling temperatures in stills, towers, furnaces, flues, lines, etc.; resistance thermometers for dewaxing and other low temperatures; pressure and vacuum gauges for measuring and controlling pressures and vacuums in stills, towers, steam plants, etc.; tachometers for pump and fan speeds; thermometers for temperatures up to 800° F.; and CO_2 meters for checking per cent CO_2 in furnaces to insure proper firing.

The exhibit is in charge of F. M. Poole, district manager. Other representatives of the company are George W. Keller, vice president and general sales manager, G. S. Younkin, J. V. Mannion and R. W. Groendycke.

BETHLEHEM STEEL CO.
130, 131, 132, 133 Texas Building

The Bethlehem Steel Corp., Bethlehem, Pa., has on display an exhibit of Bethlehem pipe in various sizes together with photographic transparencies showing views in the plant. There also is an exhibit of alloy steels, corrosion-resisting steels, and tool steels; special forgings; corrugated galvanized sheets, bolts and nuts, oil burning equipment, and illustrations of forged steel drums for oil refineries.

Bethlehem representatives in attendance are Charles Schenck, production engineer; W. H. Hart, manager of sales, pipe and tubular products; E. J. Seaman, sales department; J. Tierney, sales department. W. C. Chapman, manager of sales, St. Louis office, and O. W. Klinger, sales department.

BAKER OIL TOOLS CO.
98, 113 Oklahoma Building

The Baker Oil Tools Co., Huntington Park, Calif., is exhibiting a large line of Baker products. The company is featuring the new Baker cement Whirler shoe and its companion, the Baker high cement Whirler shoe, for which a new standard of efficient performance in cementing is claimed. For the benefit of those familiar with the Baker line it may be said that Whirler shoe is an adaptation of and an improvement on the regular Baker-Burch side hole cement float

shoe. The manner in which the slots are introduced into the surface of the shoe is shown in the accompanying illustration. The flow or discharge area of these slots is approximately the same as that of the side holes over which they are imposed. The Baker cement Whirler shoe consists of a Baker formula concrete plug, cast and anchored in rounded grooves in a plain casing shoe, 18 inches in length. The concrete plug contains the Baker-designed composition ball check valve. Four side holes, of suitable dimensions, lead out from the valve chamber, and are partitioned below the valve seat, not interfering in any way with the floating properties of the shoe. A milled slot is cut in the shoe at the point of exit of each side hole for the introduction of the baffle plate which controls the flow of the mud fluid or cement.

The Baker high cement Whirler shoe is a variation of the standard Baker cement Whirler shoe in which the slots or circulating ports are placed at a greater distance above the guide. This insures circulation when landing extremely long and heavy strings of casing on or near bottom under unusual conditions.

The length, overall, of the Baker high cement Whirler shoe is 45 inches, the Baker-formula concrete guide extending 5 inches beyond the special casing shoe, which is 40 inches long. The slots or circulating ports are placed 28 inches above the bottom of the guide, affording ample clearance.

BOVAIRD SUPPLY CO.
26, 27 Texas Building

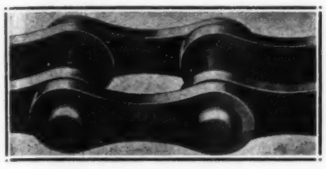
The Bovaird Supply Co., Tulsa, is exhibiting in Booths 26 and 27, Texas Building, featuring the Bovaird split slip type tubing elevator, with one operation, using an electric hoist as a means of raising and lowering it. The outstanding features of the elevator are the split design and the use of tapered slips with a positive release that is independent of the slips, accomplished by having the two halves of the bowl rock away from each other when the load is released. The entire structure except the bails.

which are of the usual type and are hand forged, is made of special analysis steel castings, specially heat treated for the service required.

F. D. Bovaird, vice president, is in charge of the exhibit, assisted by S. J. Raphel, sales manager, and the following store managers: C. A. Black, Wichita; T. C. Beardmore, McPherson; C. V. Dennis, Independence; J. B. Hubbard, Sapulpa; D. C. Kennedy, Borger; F. J. Robbins, Oklahoma City, and W. D. Williamson, Seminole.

BALDWIN-DUCKWORTH CHAIN CORP.
Baldwin Division
12, 13 California Building

The Baldwin-Duckworth Chain Corp., Baldwin division, Worcester, Mass., is exhibiting the new Baldwin deep well superservice chains 1030 SS and 1240 SS. These chains embody simplicity in design, dependability, long life, flexibility and smooth running over standard sprockets, along with easy assembly and disassembly in the field. Alloy steels are used throughout in constructing



these chains. A patented pin lock is said to have overcome objections previously found in either riveted or cotter pin types of oil well chains. This pin lock is positive and sure, yet simple and easy to assemble. These chains embody straight side-bar construction, originated by Baldwin, and also precision machining of all parts.

The exhibit is in charge of George J. Fix of George J. Fix Co., Dallas, Tex., assisted by other Baldwin representatives.

THE BURDETT OXYGEN CO.
1 California Building

The Burdett Oxygen Co., a unit of Compressed Industrial Gases, Inc., Chicago, has headquarters in Oklahoma City. Its exhibit consists of a display of oxygen, acetylene and hydrogen cylinders. In addition to the tank equipment in which industrial gases are compressed and delivered to the consumer, there are a variety of other items incidental to the welding industry, such as the Welderz Frend portable acetylene generator, welding and cutting apparatus, welding rod and other accessories.

The company's booth is shared by the Shawinigan Products Corp., New York, manufacturer of high-grade calcium carbide, and it too has a display of containers as well as samples, literature, etc.

The Burdett Oxygen Co. for 15 years has been manufacturing and distributing commercial oxygen and hydrogen and more recently entered the acetylene gas manufacturing field with the erection of a plant in Oklahoma City.

The booth is in charge of R. E. Morgan, district sales manager for Burdett; W. J. Lacey, merchandise manager Compressed Industrial Gases, Inc.; Henry Booth, general sales manager, and J. J. Kelly, St. Louis district sales manager, Shawinigan Products Corp.

BRODERICK & BASCOM ROPE CO.
83, 128 Oklahoma Bldg.

The Broderick & Bascom Rope Co., St. Louis, Mo., has a revolving exhibit showing various kinds of wire rope, also samples and other items of interest to users of wire rope. M. R. Gayle, Mid-Continent sales manager, is in charge, with the following other representatives: J. B. Broderick, president; Fred Zimmerman, sales manager; E. M. Stephanus, distribution manager; T. E. Alexander, Oklahoma representative; J. M. Crowe, Kansas representative; M. R. Henderson, Houston branch manager; W. S. Hovis, West Texas representative; F. C. Thacker, West Virginia representative. The company's headquarters are in the Mayo Hotel.

BLAW-KNOX CO.
5 Refiners and Marketers Building

The Blaw-Knox Co., Pittsburgh, Pa., is exhibiting the company's Tracyfiers by a small but full-size working unit. The Tracyfier is a steam purifier to assure the continuous delivery of clean dry steam. It has also been adapted for use with air or gas. The Tracyfier exhibit is enclosed in a section of a standard boiler drum and air and water blown into and through it. Clean dry air exhausts to the atmosphere. Its basic principles and its use are explained by attendants who also answer any questions concerning the Blaw-Knox gas cleaner, formerly known as the Empire type or Acme gas cleaner, which removes sand, dirt, pipe scale or other foreign matter from gas.

In addition the company is exhibiting Blaw-Knox Electroforged steel grating, a one-piece grating consisting of a rectangular mesh, built up of flat bearing bars crossed at right angles by twisted cross bars, the intersection being made one piece by electroforging under enormous pressure.

G. M. Kirkpatrick, sales manager, is in charge of the display.

THE BRISTOL CO.
1, 2 Scientific and Technical Building

The Bristol Co., Waterbury, Conn., is showing a representative line of indicating, recording and control equipment for natural gasoline and oil refining plants. Of particular interest this year is a new device for the automatic control of air gas-lift plants. This device consists of an automatic control instrument which through motor-operated diaphragm valves automatically controls the flow of air gas to the wells at regular intervals. For the best efficiency of the individual well and the plant in general, any cycle of operation can be obtained and determined by the character of the rock formation to gain the maximum flow from the wells where air gas-lift stations are in operation.

The exhibit includes a new type of electric pyrometric control for refineries, especially cracking units which incorporates new features of close control now desired by refinery engineers.

In addition to these, a line of industrial thermometers, air-operated control equipment, recording pressure gauges and thermometers is shown.

The following are present at the show; H. T. Weeks, T. F. Herring, L. E. Mustard, J. L. Hodgkinson, H. L. Griggs, general sales manager, and J. B. Kelsey, assistant sales manager.

ROBERT BOSCH MAGNETO CO., INC.
50 Oklahoma Building

The Robert Bosch Magneto Co., Inc., Long Island City, N. Y., is exhibiting magnetos, spark plugs, voltage regulated generators and fuel pumps and injectors for Diesel type engines. A feature is a complete range of magneto equipment for all types of oil field work from small single cylinder engines to giants of several thousand horsepower. A new line of Robert Bosch spark plugs is shown, including several types developed specially for oil field work. The Robert Bosch fuel system for solid injection, Diesel-type engines is shown in operation by means of a motor-driven demonstration set with transparent glass cylinder.

The exhibit is in charge of L. C. Carlton, J. E. Wild, F. Oberle, Kenneth Scollay and M. S. Linton.

RALPH N. BRODIE CO., INC.
42 Refiners and Marketers Building

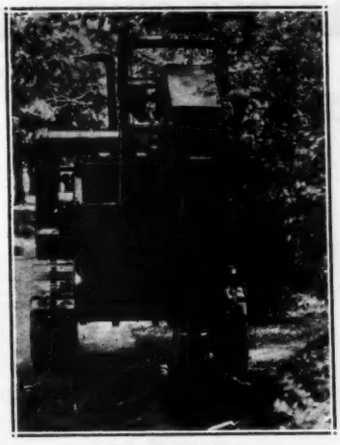
New to the International Petroleum Exposition is the Ralph N. Brodie Co., Inc., Oakland, Calif., manufacturer of petroleum meters. This organization is exhibiting its Universal displacement meters for use on shiploading terminals, bulk plants, truck tanks, as well as various pipe line and refinery units. The popular model displacement meter for dispensing pumps is seen in actual operation for the first time. In addition is a line of accessory devices such as strainers, air release valves and specially designed vertical counters.

Walter W. Brown is in charge of the exhibit, with Jack Walton, southwestern manager; William M. Rankin, pump meter divison manager, and Ralph N. Brodie, head of the company.

BARBER-GREENE CO.
Lot H, Open Air Space

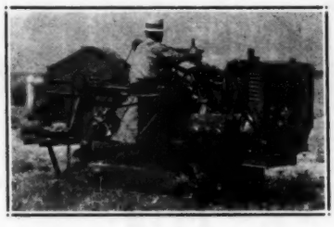
The display of the Barber-Greene Co., Aurora, Ill., in addition to its 1930 model Pipe Line Special ditcher, a type of machine which has been exhibited before, is showing for the first time two new machines, the new Light Utility ditcher and the new baby Service Special.

The Light Utility ditcher is said to be the only machine built which has a vertical offsetting boom. By means of racks and pinions, the boom may be offset to either side of the machine while it is



Light utility ditcher

digging, thus enabling the ditcher to graze objects that would block a bigger or a rigid boom machine. The Utility is applicable chiefly to cutting gas lines and services. It is only 16 feet 6 inches long overall when digging, 5 feet 9 inches wide, and 8 feet 8½ inches high. It cuts a trench from 8 to 15 inches wide, and 4 feet or 5 feet 6 inches deep. Like the Pipe Line Special, it is crawler mounted, has self cleaning buckets, and



Service special ditcher

is protected against strains by a patented overload release sprocket. A variable 10-speed transmission allows it to dig at a rate of 18 inches to 11 feet 2 inches per minute, and a followup scraper insures a clean ditch.

The new Service Special ditcher is the smallest ditcher ever designed by the Barber-Greene Co. Its overall width is only 4 feet and its length when traveling is 11 feet 6 inches. The vertical digging boom makes a cut 3 feet deep, and when digging, the highest part of the machine is about 5½ feet high. It weighs only 7,000 pounds. It is built especially for digging services, and for gas line and conduit work. Because it is so small and compact, it is highly maneuverable and fast. It has a wide range of digging speeds from 15 inches to 22 feet per minute, and cuts a trench from 5 to 8 inches wide. It can start and end a trench abruptly, leaving nothing to be removed by hand, and it can dig right up to the curb or sidewalk. The Service Special is a miniature, in all the features, of the big standard B-G Vertical Boom ditcher.

Members of the Barber-Greene organization present are H. H. Barber, president; W. B. Greene, vice president; J. M. Bruns, ditcher division head; and E. H. Cooper, manager Kansas City office.

BRADEN STEEL CORP.
35 Oklahoma Building

The Braden Steel Corp. of Tulsa is exhibiting its standard sectional steel buildings for oil field and other industrial purposes. The buildings are constructed in standard units such as side wall sections, columns and roof trusses. Side wall galvanized corrugated sheets are fastened to section frames in the shop. Doors and windows are fastened in place before shipment. All work possible is done in the factory to insure accuracy and good workmanship and to keep down erection expense. In charge of the exhibit are C. E. Bates, R. W. Mauthe, A. L. Day, Duke Merrill and H. V. Carter.

THE BURT CORP.
4, 5 Texas Building

The Burt Corp. is occupying Booths 4 and 5 in the Texas Building, exhibiting the Burt Swab. Since the Exposition last year the company has developed three new sizes for use in 1-inch, 1¼-inch and 1½-inch A.P.I. tubing. These are on display, in addition to the larger sizes more commonly used in the Mid-Continent Field.

One of the booths will be fitted out as a lounge, and the exhibit will be in charge of L. G. Burt, with other members of the organization in attendance.

BUCKEYE IRON & BRASS WORKS
22 California Building

The Buckeye Iron & Brass Works, Dayton, Ohio, has a complete display of its service station equipment, mounted on boards for full visibility of all the different items. The products consist of foot valves, fill boxes, hose nozzles and hose nozzle valves, foot valve extractor fittings, gate valves, and many other valves used in a complete service station installation. Many of the valves are cut in sectional view so the entire working parts can be seen.

H. W. Webb, sales manager, is in charge of the exhibit, assisted by George R. Bardsley.

BOTFIELD REFRACTORIES CO.
57 Refiners and Marketers Building

The Botfield Refractories Co., Philadelphia, Pa., is exhibiting its entire line of refractories products, the Adaproducts. The exhibit includes a display of the company's products, packaged, as well as specimens showing the use and application of each refractory.

The booth is in charge of Axel H. Engstrom, sales manager, assisted by Alvin Crais, southwestern field representative, and representatives of the Marshall Supply Co., distributor of Adaproducts in Tulsa and surrounding territory.

THE BORDEN CO.
84 Oklahoma Bldg.

Among new Beaver tools featured in the exhibit of the Borden Co., Warren, Ohio, is the Beaver "Three-Way," which is made in two sizes, No. 33 threading three-eighths, one-half and three-fourths inch, and No. 34 threading one-half, three-fourths and 1-inch. The display includes also Beaver die stocks Nos. 3, 6, 11, 8-R, 25, 26 and 41; square-end pipe cutter No. 5; grooving tools Nos. 12 and 20, and Beaver power drive No. 45.

BAILEY METER CO.
57 Scientific and Technical Building

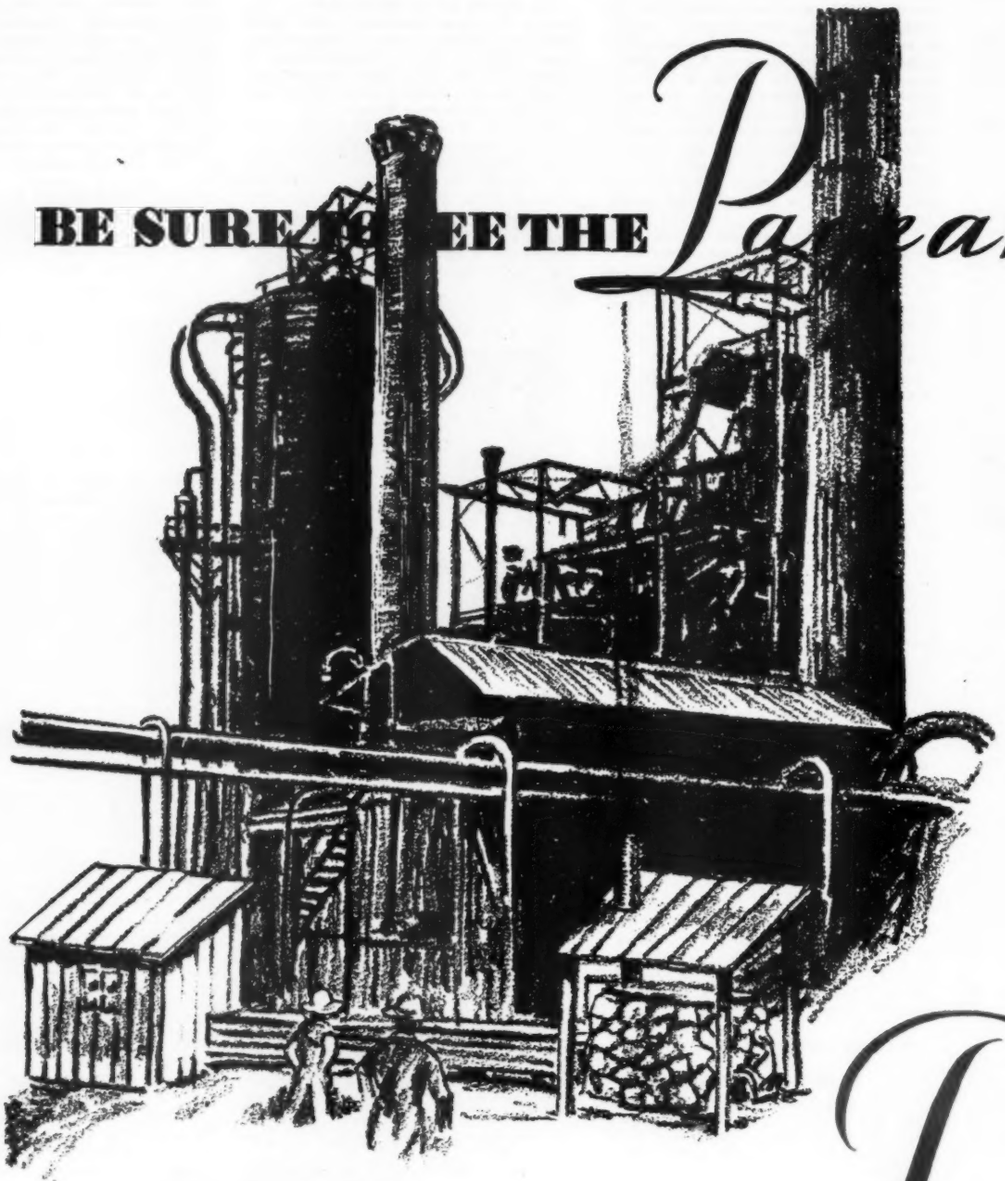
The Bailey Meter Co., Cleveland, Ohio, is exhibiting a boiler control panel on which are mounted a Bailey boiler meter, a Bailey fluid meter, a Bailey multi-pointer gauge and a long-distance liquid level indicator. This steel plate panel board is approximately 8 feet high.

The boiler meter is designed to indicate, record and integrate the steam flow from a boiler, to record air flow supplied for combustion and to record flue gas temperature of gases as they leave the heating surfaces of the boiler.

The fluid meter is designed to measure steam to a turbine, or feed water to the boilers. In either case records of pressure and temperature are made on the same 12-inch uniformly graduated chart along with the record of the rate of flow.

The multi-pointer draft gauge is used

BE SURE TO SEE THE Pageant



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The World's

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to indicate the secondary factors in the control of a boiler unit. These factors usually consist of drafts and pressures at the various points in the furnace boiler economizer and air heater.

The remote type liquid level indicator can be used for indicating the height of oil in oil storage tanks, or for indicating boiler water level.

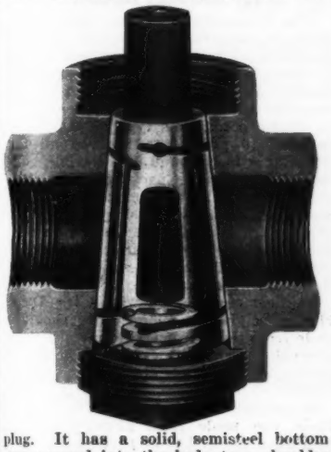
The Bailey electrically operated fluid meter for the measurement of oil, water, steam or gas, and the Bailey thermo-hydraulic feed water regulator for controlling feed water flow to steam boilers are also exhibited.

The booth is in charge of C. E. Albert, manager of the Kansas City office, assisted by C. M. Kunkel, manager of the Houston office.

BARCO MANUFACTURING CO.
8 Refiners & Marketers Bldg.

The Barco Manufacturing Co., Chicago, is exhibiting Barco lubricated plug valves, Barco service and curb cocks and Barco flexible joints. The service and curb cocks have not been shown before.

The Barco lubricated service cock is made of high-grade semisteel, carefully machined and fitted for tightness; set screw lubrication, full lubricant grooves and a rust-proof steel spring under the



plug. It has a solid, semisteel bottom cap screwed into the body to a shoulder without makeshift adjustments or trimmings. The bottom of the valve is sealed tight with corrosion-resisting, durable semisteel.

Barco lubricated plug valves have the advantages of full direct port opening with one-quarter turn of the handle or wrench, and give a smooth turning valve that can be throttled or opened wide at will. The fit between the plug and body is such that the lubricant is not relied upon to make a tight seat. The lubricant is used to prevent wear and to make the valves work easily. The packing gland may be removed and the valve repacked without danger of the plug blowing out.

Barco joints have been in service for 10 years in almost all industries where flexible conveyors are required for oil, steam, water, air, gas, etc. These joints are also used to take care of expansion and contraction in pipe lines, and to prevent breaks and leakage from intermittent vibration. The gaskets in these joints are suitable for practically all purposes for which metal joints can be used. They are soft enough to provide two perfect seats for the ball at all times, and yet are hard enough to insure long life and freedom from repairs for many years. Having gaskets on both sides of the ball, the joints are equally serviceable under suction and pressure.

BENJAMIN ELECTRICAL MFG. CO.
43, 44 Refiners and Marketers Building

The Benjamin Electrical Manufacturing Co., Chicago, is exhibiting an interesting line of lighting equipment and other electrical specialties particularly adapted for use in the producing, transportation, marketing and servicing phases of the oil industry.

The new Duo-Service floodlight gives an effective and uniform coverage of high intensity overground area, yards, drives, and pump stations, at the same time, floodlighting to a much higher intensity the building on the lot.

There is also a complete showing of the heavy-duty gas and vapor-proof lighting equipment and the "1500 series" lighting equipment for hazardous locations. The pit lighting unit, especially developed for the lighting of greasing pits, hydraulic lifts, washing racks, etc., is shown.

Among other electrical equipment is the Benjamin-Starrett panelboards for lighting and power and the supersensitive relay for difficult signaling problems connected with pipe line telephone and other audible signaling.

The company is represented by C. B. Harlow, O. C. Westberg, H. R. Heitzman and F. A. Callahan.

THE BUDA CO.
67, 68, 69, 70 Oklahoma Bldg.

The following engines are displayed by the Buda Co., Harvey, Ill.: Model H-199, 4-cylinder, 3¾"x4½" gasoline engine; Model FR power unit, 4-cylinder 5½"x6½" gasoline engine with sheet metal hood mounted on cast iron base; Model JH-4 power unit, 4-cylinder 6"x 7⅛" gasoline engine with sheet metal hood mounted on cast iron base; Diesel Model D4-23, 4-cylinder, 6"x8"; Diesel Model DM6-30, 6-cylinder, 6½"x8¾".

The Buda Diesel engines are particularly adapted to pipe line pumping and several were put in this service this year.

COLUMBIAN STEEL TANK CO.
Lot M, Open-air Space

The exhibit of the Columbian Steel Tank Co., Kansas City, Mo., includes one of the company's newest 1,000-gallon frameless semitrailer truck tanks believed to embody every known feature of tank building for utility, beauty and safety. Also there is an A.P.I. 100-bbl. bolted steel tank with Columbian deck and bottom, and fitted with the new Leakproof nut. One of the late refueling units is shown, as are several sections of the new Columbian interchangeable stairway and walkway. Buckets, cans, funnels and minor equipment for the oil marketer complete the exhibit.

CLARK BROTHERS CO.
Lot A, Open-air Space

Clark Brothers Co., of Olean, N. Y., have a 30x80 foot space, Lot A, in the open-air division of the grounds, on which it is exhibiting the company's new 8-cylinder vertical gas and gasoline engine. This machine is connected to a Froude hydraulic dynometer, recently imported from England. This dynometer is said to be in a class by itself. There are very few of them in the United States and those that are are said to be owned only by the largest engineering firms and the larger engineering universities. The Clark Brothers Co. is also exhibiting its new 60-horsepower two-cycle gas engine direct connected compressor unit, and its new two-cylinder vertical gas engine pumping unit. The machines are in operation. Compressor cylinders, honed in the company's shop also are shown.

In attendance are J. S. Reid, president; C. P. Clark, vice president, of Olean; J. B. O'Connor, general sales manager; William G. Cummings, Mid-Continent manager; D. K. Hutchcraft, sales engineer; P. D. Baker, sales engineer; and George W. Probst, service manager.

CHRISTIE BURNER CO.
4 Arcade

The Christie Burner Co., Tulsa, is displaying in Booth 4, Arcade Building, showing low-pressure gas burners, oil field type; Christie low-pressure gas burners, domestic type; and Air-Circo gas fuel radiators. Christie burners, the manufacturers say, are available to the oil industry in Oklahoma, Texas, New Mexico, California and in West India; are simple in construction and operation and efficient under all types of fuel gases, while the Air-Circo radiators are said to distribute more heat at a lesser cost; eliminate wall sweat and are fumeless. In charge of the exhibit are H. W. Christie, V. S. Christie, and Clark R. Bergseth.

CHICAGO BRIDGE & IRON WORKS
80, 81 Texas Building

The Chicago Bridge & Iron Works, Chicago, is featuring the Horton-spheroid, a new type of tank developed for storage of volatile liquids under pressure. This tank was designed to provide stor-

age which will withstand internal pressure in large units with greater economy than has been possible with the type of containers used heretofore for pressure storage. The bottom, shell and roof form an almost continuous curve, with the result that much of the bursting force is transferred to the roof and bottom and all of the metal serves for effective stress purposes.

A Wiggins floating roof is shown on a storage tank which forms part of the automatic pump station exhibit at the eastern end of the grounds.

CALIFORNIA TALC CO.
Open-Air Space

A miniature reproduction of an oil derrick, with a mud circulating system, is the feature of the exhibit prepared by the California Talc Co., Los Angeles, Calif., manufacturer of Aquagel, a colloidal compound for rotary mud. Samples of various drilling muds are shown, together with specimens of Aquagel. Demonstrations as a regular part of the exhibit show how the basic characteristics of different muds are improved by being treated with Aquagel. Laboratory equipment used demonstrates the treatment of rotary mud from the scientific point of view.

CLARK MACHINE CO.
Open-Air Space

The Clark Machine Co., Wichita Falls, Tex., is showing its new Model 61 Wichita Falls spudder with the crawler type of power and an additional power unit consisting of a Hercules motor. This spudder in actual operation is capable of drilling to 4,000 feet.

The main frame is 6'16"x23'6". It is 61 inches wide inside. The bandwheel is 98 inches in diameter, with 15-inch face, held in place by two heavy 32-inch flanges, both double-keyed on quarters to prevent the bandwheel from working loose on the shaft.

The calf-wheel is at the front of the machine, next to the mast, so that the pull is straight down to prevent the back of the machine from rising when pulling heavy strings of pipe. It has double brakes, two speeds forward and reverse, giving an extra low speed for pulling long strings of pipe and high speed for picking up empty blocks or light loads without unnecessary shifting of chains and sprockets.

The drilling and hoisting clutch is of the heavy friction band type. The clutch shaft runs on large, self-aligning ball bearings.

CITIES SERVICE OIL CO.
38 Refiners and Marketers Building

The display of the Cities Service Oil Co., marketing division of the Empire Companies, Bartlesville, Okla., depicts a scene on the side of a mountain. A stream of oil runs down the mountain into a basin at the foot and then on over the edge. Behind the stream of oil at the foot is a display of colored lights showing a rainbow effect. On the sides of the mountain are oil derricks with pumping machinery working. A road comes out of the mountain on one side and runs to the other over a bridge to a filling station of the latest type, and on back into the mountain. Electric cars run over this road and stop at the station for gas, etc. Behind the display is an oil painting showing an oil field, refinery, city, etc. The furniture used is of the rustic type to conform with an exterior display. The filling station, oil derricks, etc., are lighted and the mountain is illuminated by concealed lighting.

C. A. Willis, general sales manager, Cities Service Oil Co.; O. J. Tuttle, sales manager, Empire Oil & Refining Co.; Charles Self, division manager, Cities Service Oil Co., and R. J. Daugherty, director of Public Relations, Empire Companies, are in charge of the booth.

C. F. CAMP CO.
87, 88, 123, 124 Oklahoma Bldg.

The features of the Camp-Waukesha exhibit this year include two sizes of Diesel engines and an air-actuated forward and reverse standard tool drilling unit. The Diesels shown are a four-cylinder 100-horsepower engine and a six-cylinder 250-horsepower engine.

A complete line of Neilan Co., Ltd., regulating equipment and reducing valves is shown.

CONSISTOMETER CORP.
31 Scientific and Technical Building

The Stephens consistometer, manufactured by the Consistometer Corp., Chicago, is a mechanical device for testing the qualities of lubricating oil under va-

rious conditions. The instrument provides five different mechanical tests, the result of which can be obtained in an hour or two. The combined tests provide a comprehensive picture of what the performance value of the oil will be under actual operating conditions.

Not only does the exhibit comprise the 1931 model, but several earlier models, illustrating the development of the consistometer over the last seven or eight years, indicate the time and research expended on this machine. The earliest consistometer looks much like a lighthouse, the next has much the appearance of a battleship and the third development forecasts in rough outline the present instrument.

The inventor of the instrument, Elton S. Stephens, vice president and chief engineer of the Consistometer Corp., is in personal charge of the booth.

COFFING HOIST CO.
2 California Bldg.

"The little hoist with the big pull" is the way the Coffing Hoist Co., Danville, Ill., describes the machines which it is exhibiting. The hoists, with their capacities and weights, follow: Model A, ¾-ton, weight 13 pounds; Model F, 1½-ton, weight 25 pounds; Model F-S, 3-ton, weight 36 pounds; Model Z, 6-ton, weight 65 pounds. All hoists are tested above rated capacity before leaving the shop. They can be used in any position.

CAMERON TOOL & SUPPLY CO.
58 Oklahoma Building

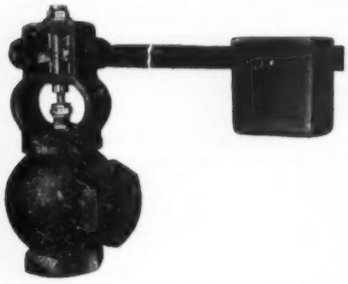
The Cameron Tool & Supply Co., Cameron, W. Va., is featuring the Monroe spiral torpedo drilling bit and Akins underdriller bit. "Talon line" rope grabs, spears and "Talon" friction sockets are

other exhibits. Among the tools more recently developed are the Monroe jar down slip socket and the Cameron safety casing drive ring.

The exhibit is in charge of F. B. Dillaman and L. D. Rees.

THE CHAPLIN-FULTON MANUFACTURING CO.
62 Scientific and Technical Building

The Fulton lever safety valve is one of the new pieces of equipment being shown by the Chaplin-Fulton Manufacturing Co., Pittsburgh, Pa. For the protection of a low pressure distribution system a safety valve set to blow at say 60 pounds is usually installed between the high pressure and low pressure regulators. For such service the Chaplin-Fulton Manufacturing Co. recommends the lever safety valve which can be furnished to blow at any pressure between 10 pounds and 100 pounds. Lever safety valves are equipped with tight soft seats.



The exhibit comprises the company's newest liquid level controllers; its standard line of pressure reducing regulators, which include the Duplex sensitive gas governor and Duplex vacuum governor, and various parts of standard reducing valves. The company also is showing its new motor valve for use in conjunction with air block and similar control systems. The motor valve in the small sizes is equipped with removable valve and valve cage so that a smaller or larger valve opening may be obtained by using the same valve body.

A set up, in one line, of the Fulton Duplex vacuum governor and the Fulton Duplex relief valve is of special interest. The application here is on oil storage tanks handling vapors. The purpose accorded to the vacuum regulator is to prevent creating too great a vacuum with a tendency toward collapsing the tank, while the relief valve is to prevent the accumulation of too great a pressure in the tank.

Thomas H. Thorn, assistant engineer, and F. N. Goedert are in charge.

CORNING GLASS WORKS
22, 23 Scientific and Technical Building

A striking example of the extent to which glass has been enlisted in the service of the chemical and petroleum industries is shown by the Corning Glass Works, Corning, N. Y. The following Pyrex resistant glass equipment is exhibited: Complete line of laboratory ware; three-section fractionating column with Pyrex shell, perforated plates and down pipes; 24-inch bubble cap plate, sight glasses and sheet glass; high-tension one-piece insulators up to 70 KV size; communication line insulators; methods of assembly for incorporating Pyrex tubing into condenser, evaporator and cooler construction; special flange piping, fittings and accessories; socket pipe and pulsometer tubes; gauge glasses and tubing.

A demonstration by an expert glass worker, fabricating special Pyrex articles is given. Robert T. Sherwood and W. T. Levitt are in charge.

CATERPILLAR TRACTOR CO.
Lot G, Open-Air Space

Caterpillar tractors, manufactured by the Caterpillar Tractor Co., Peoria, Ill., are shown by several manufacturers of winches in their several exhibition spaces. The company's own exhibit is limited to educational moving pictures showing the latest oil field and pipe line developments as worked out in practice with Caterpillar tractors.

THE COOPER-BESSEMER CORP.
Lot G, Open-air Space

Four units developed and introduced to the oil and gas fields in the last year make up the exhibit of The Cooper-Bessemer Corp., Mount Vernon, Ohio.

One of the two operating units in the exhibit is a Type GA pumping and drilling engine. The special features of this engine are its Timken main roller bearings, its die-forged crankshaft, the sturdy main frame, and its improved air valve and special materials where needed.

The other operating unit is a Type 14 vertical gas engine, 10½"x14". The unique features of this engine are its unusually strong main frame, the die-forged crankshaft, the drop-forged connecting-rod, its silent roller chain driven camshaft, which is carried on roller bearings, and the separate mixing valve for each cylinder. This engine is built in sizes from 75 to 200 b.h.p.

The third unit is one size of the company's new line of compressor cylinders. These cylinders will be built in six series of sizes ranging in diameter from 5 inches to 20 inches.

The fourth unit is a heavy type reverse clutch. This is for pumping and drilling engines and will be equipped with a 5-inch shaft.

CONTINENTAL SUPPLY CO.
Continental Building and Open-air Space

The Continental Supply Co., St. Louis, Mo., has both inside and outside exhibits.

In the Continental Building the Youngstown Sheet & Tube Co. shows a miniature pipe mill in operation. Westcott Valve Co., Grinnell Co., D & B Pump & Supply Co., Mechanical Rubber Co., Goodall Semi-Metallic Hose & Manufacturing Co., Tnemec Paint Co. and New Bedford Cordage Co. show their newest products.

The outside exhibit consists of an Emsco Derrick & Equipment Co. electric rotary drilling outfit complete with GE motors, and the new Gardner-Denver steam pumps, power pumps and drilling engine. Fairbanks, Morse & Co. have in operation both Diesel oil engines and twin-cylinder gas engines. Farrar & Treft show the new superheated boilers.

CLIMAX ENGINEERING CO.
76, 77, 135 Oklahoma Building

New oil-field drilling, pumping and generating units are exhibited by the Climax Engineering Co., Chicago. The eight-cylinder, 200 to 250 horsepower Holemaker designed for deep cable-tool and rotary drilling, completely equipped with radiator, telegraphic control, gas mixing valve, standard accessories and drive pulley supported by rugged outboard bearings portray the company's achievement in drilling engines.

A new pumping engine of the six-cylinder, 150 horsepower type, mounted on sub-base and direct connected to forward and reverse pulley drives is another product of interest. This unit has been developed primarily for quick and easy adaptation to the new pumping rig fronts.

A six-cylinder, 150 horsepower generating set shows a direct-connected unit completely assembled and mounted on sub-base, making a compact portable unit.

All equipment shown is equipped with the "Blue Streak" valve-in-head engine, capable of delivering greater horsepower per cubic inch of displacement, and economically burning three types of fuel: gasoline, natural gas and distillate.

Those in attendance at the exposition are Edward F. Deacon, president; W. J. Dukes, general sales manager; L. L. Machia, manager of oil field equipment sales, and Forrest Dunlap, district manager for Oklahoma, Kansas, Arkansas and Colorado.

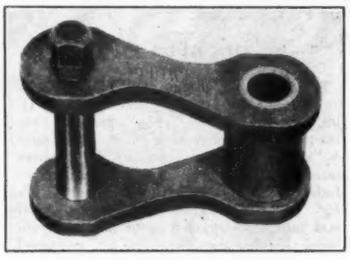
CROUSE-HINDS CO.
31 Scientific and Technical Building

The Crouse-Hinds Co. of Syracuse is exhibiting in Booth 31, Scientific and Technical Building, the exhibit comprising electrical wiring, fittings and apparatus especially adapted to use in oil field and refinery locations, either hazardous or general, and consisting of conduits, vapor-proof light fixtures, vapor-proof switches, plugs and receptacles, grounding equipment, panel boards, portable lights and floodlights.

The exhibit is in charge of Floyd C. Smith, Syracuse, N. Y.; G. G. Griffin of Dallas, Tex., and Frank G. Fuller of Kansas City, Mo.

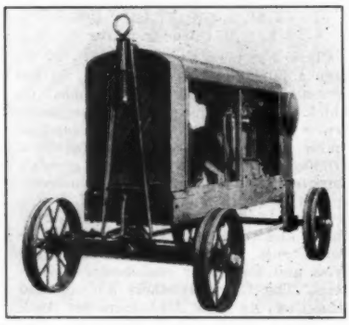
CHAIN BELT CO.
8, 9 Texas Building and Open-air Space

The Chain Belt Co., Milwaukee, Wis., has two separate displays this year. In booths 8 and 9 in the Texas Building it is showing the Rex Deepwell Chabelco chain for the oil field. There have been



no radical changes in the design of Rex Chabelco, but the working life has been increased by the improvements in alloy steels used and the perfection of automatic processes of manufacture. These improvements give great ultimate wearing value. Investigation and research have shown that tensile strength alone in the oil well chain means little, for the chain may have plenty of tensile strength, yet shake to pieces under vibration or wear out quickly under the flexing action as it passes over the sprockets. Aside from the improvement in alloy steels, there are three other major factors that help to make up the great wearing value: accuracy of pitch, smooth bearing surfaces and close tolerances.

Outside of the buildings, the company shows part of its line of water pumps for



oil fields. The Rex Triplex automotive type pumps are shown, also diaphragm pumps, self-priming centrifugal pumps and plunger pumps. In addition, it shows part of its line of concrete mixers for the oil fields ranging in size from a half-bag machine to a six-bag machine.

Those in attendance are Brinton Welser, secretary; A. R. Abelt, manager chain and transmission division; M. G. Jewett, engineering department; C. F. Messinger, vice president; John Smallshaw, St. Louis office, and H. S. Greene, assistant to president.

C. LEE COOK MANUFACTURING CO.
45 California Building

The C. Lee Cook Manufacturing Co., Louisville, Ky., is exhibiting a full line of Cook's graphite iron metallic rod packings and piston rings; the Cooktite sealing ring, a recent piston ring invention that effectively holds the cylinder pressures in Diesel and gas engines; and improved rod packings to serve the higher pressures prevailing in the air and gas lift services and in the pumping of natural gas.

The booth is in charge of F. Black, assisted by W. Woobank of the Tulsa office and Robert E. Kirn, sales manager from the factory.

DEARBORN CHEMICAL CO.
105 Texas Building

The "No-ox-id master coat," a late development in underground pipe protection, is exhibited by the Dearborn Chemical Co., Chicago. This master coat comprises mill coat formula 2-C for protection of the pipe in transit, followed in the field by No-ox-id "G Special" pipe coat, No-ox-id-ized wrapper and No-ox-id service coat.

Advantages of this combination named by the company are, first, the pipe is prepared for application of No-ox-id by formula 2-C (it being soluble in No-ox-id); second, No-ox-id-ized wrapper applied over the soft chemically compounded pipe coat forms a suitable bond for the service coat and allows the pipe to contract and expand within the wrapper after the soil has set tight on the outside, with no danger of materials being destroyed; third, the service coat which is bonded to the wrapper only, is of a suitable nature to withstand soil stress.

Representatives of the Dearborn Chemical Co. attending are Earl M. Converse, Chicago; George M. Massen, Kansas City, Mo.; Ted F. Kittredge, Tulsa, and I. L. Yetman, Oklahoma City.

DURAMETALLIC CORP.
111 Oklahoma Building

The Durametallic Corp., Kalamazoo, Mich., is exhibiting Durametallic packing products, the most important and newest of which is the elastic-core type of Durametallic in which the several types of metallic foil are used as a covering for an elastic core. This type of packing is designed to present to the rod all the advantages to be found in a flexible, self-lubricating metallic packing, along with the resilience and plasticity imparted by means of a 92 per cent asbestos core. The Grade D-10 Durametallic for hot oil consists of a 92 per cent pure asbestos core with a wrapper of foil made from an aluminum base alloy.

The company is showing also Dura Plastic, a plastic, semimetallic packing, made from the Durametallic metals, finely divided, combined with long-fibred asbestos, a high type lubricant, and binder.

Durametallic gaskets also . . . These are made from aluminum base metal, and are said to be particularly valuable in pipe lines through which petroleum is passing.

GLEN DIAL, INC.
Open-air Space

Glen Dial, Inc., Tulsa, is showing the Shrader portable electric arc welder for field work. Built right into the Dodge Brothers six-cylinder truck, which will develop 20 horsepower at 1,000 r.p.m., it can go wherever the truck can go. It is compact, weighs approximately 1,000 pounds and utilizes 14 inches of body space. This leaves three-fourths of the body capacity for the hauling of other materials.

The generator is driven direct by the truck engine, through a specially designed power take-off with a safety factor of seven. Ball bearings are used throughout the unit, including generator and power take-off. The reactor is of special design, being built in, and it is impossible, the manufacturers say, to short-circuit or burn out. The machine is equipped with polarity reversing switch and also a special arc length control switch, producing either a long or short arc as desired by the welder.

The generator delivers 300 amperes direct current continuous, or 400 amperes intermittent. The engine operates at a speed of 1,050 r.p.m. It is self-excited and designed to produce a smooth, steady, nonspattering arc. This smooth arc produces an even flow of metal at all times and a weld that is nonporous, nonoxidized and homogeneous throughout. The generator is controlled by an automatic electric governor, operating directly on the carburetor. This feature affords economy in both gasoline and wear on the engine, as the engine only turns over fast enough to deliver the necessary current which is predetermined by the operator.

From the same generator 1½ K.W. 110 volt, alternating power is taken to

PLENTY of POWER

for any well in these

WRIGHT RELIABLE "BIG SIX"

HEAVY DUTY DRILLING ENGINES

You'll have Plenty of Power — wonderfully smooth power — for handling any string of tools or pipe when you install a WRIGHT RELIABLE "Big Six". Rated at 150 H.P., this husky power plant has a dependable reserve of power to meet any emergency.

The WRIGHT "Bix Six" is a slow speed engine developed out of 21 years experience in building Heavy Duty Engines. Its extremely high torque at low speeds is an unusual advantage—giving remarkably fine performance in handling heavy bailers, tools, and long strings of pipe.

If you are starting a deep well, or if you expect to encounter bad formations, better make sure of Plenty of Power. It's good insurance against Trouble. If not already familiar with the "Big Six," INVESTIGATE BEFORE YOU START YOUR NEXT WELL.

On receipt of the coupon, complete description and specifications will be gladly sent you.

MANUFACTURED BY

The WRIGHT MACHINE Co., Inc.

ESTABLISHED 1880

OWENSBORO, KENTUCKY, U. S. A.

Distributed in the Mid Continent Field by the 15 Stores of

The BRIDGEPORT MACHINE CO.

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Backed by BRIDGEPORT'S 24-Hour Day and Night Service

THE WRIGHT MACHINE CO.

OWENSBORO, KENTUCKY

Gentlemen: Please send me full particulars of your WRIGHT Reliable drilling engines.

Name _____

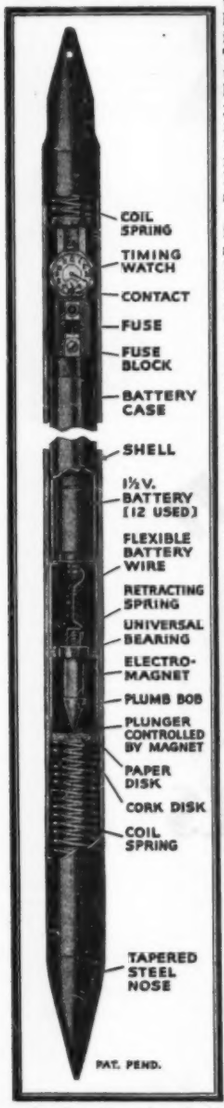
Street No. _____ City _____

Company _____ State _____

operate floodlights, grinders, drills and electric hammers. A 250-watt floodlamp is mounted on the cab to afford light for night work. Cable reels are provided in order that the cable may be reeled up after welding has been completed. Each reel accommodates 100 feet of oo cable.

DRIFTMETER, INC.
63 Scientific and Technical Building

Driftmeter, Inc., Tulsa, is exhibiting the Driftmeter and Driftmeter, Jr., electrical crooked-hole surveying instruments. The Driftmeter was exhibited last year, but this is the first time the junior appliance has been shown.



This device is lowered on a measuring line or sand line and a record is made within the instrument on a paper disc. It consists of an electro-magnetic pendulum suspended on universal bearings above a paper disc, whose center is zero deflection and whose outside edge represents 15 degrees of deflection from perpendicular. In the intermediate spaces are concentric lines each representing 1 degree. Above the pendulum is the battery case containing twelve 1½-volt flashlight batteries. The timing watch is mounted above the battery case, and is so connected in the circuit that it may be set to establish the electrical connection after any number of minutes have elapsed.

At the time the circuit is completed, current from the batteries flows through the electro-magnetic pendulum, causing a perforating needle to be thrust against the paper disc, thus recording the position of the pendulum. The discs are of convenient size for permanent filing and space is provided on the back for describing the location of the well, depth of reading and signature of operator.

THE DURIRON CO., INC.
112 Texas Building

The exhibit of the Duriron Co., Dayton, Ohio, consists of acid-proof equipment such as pumps, valves, pipe and fittings which find a general use for handling acids and other corrosives; Duriron circulating steam jets for use in sludge acid cookers; Duriron mixing nozzles, proportioning pumps and elbow jets for treating systems. There also is shown the new nickel chromium silicon alloy, Durimet, used for weak sulphuric acid conditions and produced in the form of sheet and rods as well as castings.

The company is represented by Edward Soph of Tulsa, H. L. Moyler of St. Louis, R. O. Ayres of Houston, Tex., and W. H. Scott of the general office in Dayton.

DOVER STAMPING & MANUFACTURING CO.
26, 27 Refiners and Marketers Building

The Big 4 Drain-o-Kans for hydraulic lift, oil pit or airplane are exhibited by the Dover Stamping & Manufacturing Co., Cambridge, Mass. Use of these cans is said to eliminate spilling, spattering and dripping. Wind cannot blow oil over the customer, the service man or the car. The tube is telescopic, adjustable to the required height, and the funnel is removable. The cans are made from heavy 20-gauge black sheet steel, hot-galvanized after formation and lacquered red for long service. The tube is copper-plated high-grade steel. The funnel is heavy gauge, copper-plated and equipped with three-eighths inch galvanized wire screen to catch the crankcase plug.

The company is showing also its line of funnels, measures, combination measures and funnels, drip-pans, waste cans, tube testing tanks, drain tanks, radiator fillers, gasoline cans, oilers, test cans, pump oilers and barrels.

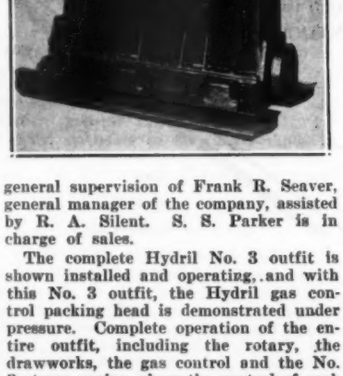
The company is represented by Louis S. Cleaves, vice president and sales manager; Horace E. Whitney, president, and Horace E. Whitney, Jr., Roy J. Hobbs and C. P. Rust, salesmen.

DYESTUFFS & CHEMICALS, INC.
66 Refiners & Marketers Bldg.

Motorists have come to know antiknock gasoline as colored gasoline and recognize their favorite gasoline by its color. Dykem colors, in all their shades and tints, are shown right in the motor fuel in the exhibit of Dyestuffs & Chemicals, Inc., St. Louis, Mo. The ease and safety of dyeing gasoline with Dykem colors is demonstrated. The exhibit is in charge of Leon Adler.

DOHENY STONE DRILL CO.
Open-air Space

The Doheny Stone Drill Co., Los Angeles, Calif., has an elaborate display of its equipment on a large, open, outdoor space with a concrete floor and a canvas roof. Two car loads of equipment weighing over 125,000 pounds were sent from Los Angeles. The exhibit is under the



general supervision of Frank R. Seaver, general manager of the company, assisted by R. A. Silent. S. S. Parker is in charge of sales.

The complete Hydril No. 3 outfit is shown installed and operating, and with this No. 3 outfit, the Hydril gas control packing head is demonstrated under pressure. Complete operation of the entire outfit, including the rotary, the drawworks, the gas control and the No. 3 steam engine, show the control of each part and the ease with which the speed or action of these parts can be instantly and delicately varied. In addition to the No. 3 outfit, the company also shows a No. 2-C outfit, mounted on a steel frame connected to an electric motor and a No. 1-B Hydril outfit, thus completing the entire line of Hydril drilling outfits made by the company. In the Hydril exhibit is seen the No. U-2 well pulling outfit mounted on a steel frame and having the ability to pull an 8,000-foot well.

Other exhibits are the separate transmission casing, through the plate glass top of which the transmission gears may be seen in operation, the core barrel, the flush joint drill pipe and tool joints, and flush joint casing and couplings. Mounted on a board so that they can be studied easily, the recording and differential bit pressure gauges are shown.

A feature is the new Hydril angle indicator, recently put on the market. The Dale and Nielson oil well surveying instrument also is shown. Interest in the exhibit is heightened by photographs and diagrammatic drawings.

DOMESTIC ENGINE & PUMP CO.
Lot P, Open-air Space

An automatic-priming, ball-bearing centrifugal pump, the latest unit of its kind made by the Domestic Engine

& Pump Co., Shippensburg, Pa., is shown by that company. It is necessary only to submerge the end of a tight suction line in water, start the engine, throw in the clutch on the vacuum pump and the pump gets its prime.

The company is showing also its latest models of open-spout diaphragm pumps; plunger force pumps; 1931 model high-pressure force pump and a gasoline transferring pumping unit.

The exhibit is in charge of W. E. Barbour, sales manager, and W. H. Derbyshire, southwestern sales engineer.

B. V. EMERY & CO., INC.
39, 40, 65, 66 California Building

The Emery removable orifice plate flange is shown by B. V. Emery & Co., Inc., who is exhibiting jointly with the Merco Nordstrom Valve Co. and the McAlear Manufacturing Co. This orifice fitting, according to the manufacturers, has the following advantages: Light weight (8-inch weighs 300 pounds with C. F. B. O.); low plate cost (special plates are unnecessary, regular thin plate is used); positive centering of the orifice plate; plate bearing surfaces automatically cleaned every time plate is changed; jack screws spreading companion flanges facilitate installation; simplicity, the same parts that clamp the plate in the body also seal off the upper plate chamber when orifice plate is removed; no danger of plate distortion in using regular thin orifice plate; narrow face-to-face dimension, preventing nozzling of flow; upstream flanges positively centered to body and not dependent on bolts to line up.

The exhibit is in charge of B. V. Emery, W. D. Emery, T. H. Campbell and E. H. Clay.

ELECTRIC SUPPLY CO.
63 Refiners and Marketers Building

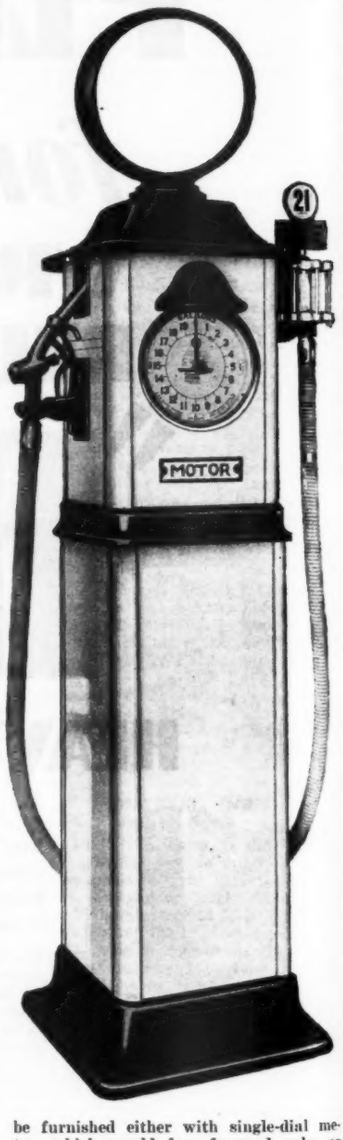
The Electric Supply Co., Tulsa, is showing a panel giving the names of the various manufacturers whose products it distributes, together with samples of wire conduit and large insulated copper wire on reels. This exhibit also displays Edison Mazda lamps.

Representatives of the company in charge of the exhibit are R. C. Stueve, president and manager; R. E. Newhouse, secretary and treasurer; E. E. Eaton, superintendent; J. P. Clark, sales manager; M. S. Reber, salesman; C. M. Rowland, salesman, and F. W. Stolba, storekeeper.

ERIE METER SYSTEMS, INC.
Lot R, Open-air Space

The Erie Meter Systems, Inc., Erie, Pa., is showing three models of Erie meter pumps, Model U 603, Model U 753, and Model UM 763 DP. In addition to this it is displaying its airport fueling unit, Model U 701 FF. All are electrically operated and can be furnished with both flow type meters and displacement type meters.

All Erie meter pumps are equipped with the Ferro pumping unit, the Neptune meter, and the housing is constructed of die-stamped steel. The U 603 can



be furnished either with single-dial meter, which would face forward only, or with double-dial meter, having a dial on each side, so that it may be seen from either side that the customer is served from. The same is true of Model U 753, with the exception that the housing on this model is of the "offset" type, having a midsection which breaks the straight line cabinet.

The Model UM 763 DP is a tandem unit, simply the construction of two meter pumps in one housing. This is convenient for use in congested places or in filling stations where space will not permit that the pumps be spread out. Two grades of gasoline are carried in the same unit, making it possible to serve the customer either grade without moving the car.

The airport unit is constructed so as to be installed underground with its top surface flush with the level of the ground. It can be installed at any airport, making it possible when the door is closed for the plane to pass over it without its

being an obstruction. At the same time the plane may be served by merely opening the door and uncoiling the hose.

THE EAGLE-PICHER LEAD CO.
49, 50 Texas Building

The Eagle-Picher Lead Co., Joplin, Mo., is exhibiting the following products: Eagle bearing metals in three grades, Dreadnaught, Outlasta, and Durable No. 4, which are particularly suited for petroleum industry machinery, Eagle patented lead wool oil well plugs. Eagle chemical sheet lead and lead pipe, Eagle oil refining litharge, Eagle white lead oil and paint, Eagle sublimed blue lead and oil paint, Eagle red lead and oil paint, Eagle leadhead nails, Eagle lead roofing washers, Eagle chemical red lead or burning bar, Eagle "66" insulating cement, Eagle pipe insulation, Eagle blanket insulation and Eagle rope socket material. In addition to these there is a special exhibit of a miniature bubble tower and oil field boiler, each insulated with the three Eagle high temperature insulating materials listed above. High temperature insulating products are new to the company's line since last year's show and special attention is given to these products this year.

The exhibition space has been prepared with care. The Eagle-Picher standard background consists of Colonial style white posts and heavy top rail, from which a dark blue, heavy silk crepe is hung with a large Eagle-Picher red, white and blue emblem suspended from the center. Colonial style railings and corner posts to match the background posts are used on the sides and fronts. The products on display are neatly arranged on six special tables of graduated heights.

E. H. EDWARDS CO.
25 Texas Building

The E. H. Edwards Co., San Francisco, Calif., is showing its different constructions of wire rope for rotary and cable tools, in Booth 25, Texas Building. In addition it has in operation an occillograph, which illustrates the sound of the voice, similar to the talkies.

FLUOR CORP., LTD.
94, 95, 96 Oklahoma Building

The Fluor Corp., Ltd., of Los Angeles, Calif., is exhibiting in conjunction with the Jackson Engineering Corp. of Tulsa.

Part of the Fluor Corp. exhibit consists of a quarter-size model of a Fluor redwood cooling tower, a replica of the Fluor standard models and showing every detail of construction. In addition, there are photographs, drawings and prints of interesting construction jobs, including absorption plants, compressor stations, boiler plants, etc., which they have engineered and built in many sections of the country. Visitors can obtain information regarding Fluor cooling towers and construction work from Messrs. Burket, Krook and Miller of the Jackson Engineering Corp., who are in charge of the exhibit.

THE FISHER GOVERNOR CO., INC.
102, 109 Texas Building

The exhibit of the Fisher Governor Co., Inc., includes the Fisher automatic specialties for the oil and gas industry and the new Fisher type No. 725 house service regulator suitable for reducing high initial pressures to house service pressure. The company also has in its exhibit this year the new Fisher liquid level control with the ball-bearing stem construction, the master level control unit and Fisher type No. 520 boiler gas fuel governor. There are other exhibits of interest. In charge are L. W. Browne, president of the Fisher Governor Co., and Kenneth R. D. Wolfe and Paul A. Elfers, engineers.

FRICK-REID SUPPLY CORP.
46, 59 California Building

The Frick-Reid Supply Corp., Pittsburgh, Pa., and Tulsa, is not exhibiting any equipment in its space for the reason that most of its manufacturing connections are handling their own exhibits. The Frick-Reid space is offered as a meeting and reception place. Literature covering the company's various lines of equipment is distributed.

FUSION WELDING CORP.
6, 7, 8 Arcade

The Fusion Welding Corp., Chicago, has in full operation new welding applications and products developed by the company's research staff for various branches of the petroleum industry.

New Weldite welding rods for both gas and metallic arc welding and pipe lines and in refineries are demonstrated. The Weldite line represents over 40 distinctly different welding rods designed to meet every requirement from the most ductile mild steel welds to the complex alloy steels for hard surfacing.

The Fuzon line of arc welding generators is shown in operation. Those designed especially for oil field work include portable models of various capacities which are compact, light weight and fully spring-mounted on pneumatic tires. These portable models may be towed behind auto or truck at 30 miles an hour or easily moved short distances by hand. Welding generators for the shop are in operation also. The complete line of Fuzon welding accessories and supplies is displayed.

Those in attendance include: M. P. Hare, southwestern district manager, Dallas, Tex.; T. V. Burns, sales engineer, Houston, Tex.; Clyde Rackley, sales engineer, Tulsa; L. F. Collins, general sales manager, Chicago; R. F. Beazell, sales promotion, Chicago.

FERRO MACHINERY & FOUNDRY CO.
33 Refiners and Marketers Building

The Ferro Machinery & Foundry Co., Cleveland, Ohio, in Booth 33, Refiners and Marketers Building, have the following exhibits:

Model 1,200-1 gasoline pump for water systems, 16 g.p.m. capacity at 1,725 r.p.m., featuring built-in by-pass and strainer. This pump is used in conjunction with one-third horsepower motor.

Model 1,200-14 remote control gasoline pump for airport service; 20 g.p.m. capacity at 1,725 r.p.m., featuring built-in by-pass. It is used with a one horsepower motor.

Model 1,200-26 remote control gasoline pump for airport service; 35 g.p.m. capacity at 860 r.p.m., featuring built-in by-pass. It is used with a two horsepower motor.

The exhibit is in charge of J. M. Howell, N. D. Edwards and H. B. Myers.

THE FRANCE PACKING CO.
101 Oklahoma Building

The France Packing Co., Philadelphia, Pa., is exhibiting metallic packings for all conditions of service and particularly for gas compressors, gas engines, and slush pumps. The exhibit is in charge of A. W. France, president of the company, assisted by representatives in the oil fields.

THE FAIRBANKS CO.
29, 30 Texas Building

In Booths 29 and 30, Texas Building, the Fairbanks Co., New York, is featuring its brass and iron valves and dart unions, showing some highly polished valves that have been bisected in order to show their construction and operation. The booth is in charge of George W. McLean, Jr., the Fairbanks representative in Tulsa; J. A. Cleary, treasurer, and T. A. Taylor, sales manager, both of New York, and George Humphreys, sales manager, St. Louis, and C. P. Fouts, district manager, Forth Worth, are also in attendance.

FEEDWATERS, INC.
Lot R, Open-air Space

The business of Feedwaters, Inc., Philadelphia, Pa., is conditioning industrial boiler water, jacket cooling water and building hot water systems against the formation of scale by new methods. At the exposition it demonstrates its method, which involves the use of an organic colloidal matter classified as a true member of the protective colloid group. The colloidal particle which the company uses bares a negative electric charge. When the colloidal particle comes in contact with the positive charged metallic salts which form scale, the negative charge on the colloidal particle is neutralized, and as a result the colloid is converted to its colloidal gel. From this point on the action of the colloidal jel is physical in that it absorbs and adsorbs or occludes from solution the scale-forming chemical.

The company has 18 samples of the different types of its material as mentioned and demonstrates the negative polarity of the colloid it uses. Also it has under continuous operation a demonstration of the action of its colloidal treatment on sample of extremely hard water from western Oklahoma areas.

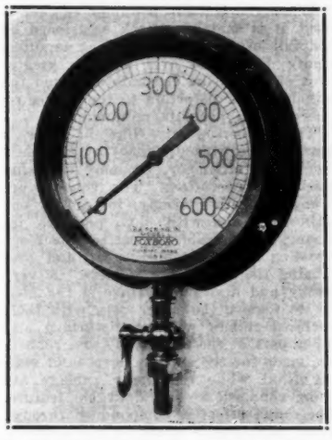
The exhibit is in charge of H. S. Basset and D. K. Fagg of Tulsa, representatives of Feedwaters, Inc., in Oklahoma and Texas.

FEDERAL MALLEABLE CO.
6, 7 Texas Building

The Federal Malleable Co., West Allis, Wis., is displaying Malleable oil field castings. The exhibit is in charge of Kurt Siemens, sales manager.

FOXBORO CO.
4, 5, 6 Scientific and Technical Building

The Foxboro Co., Foxboro, Mass., has on exhibition many new and advanced instruments for the oil and gas industries. A leader among these is their new refinery pressure gauge, illustrated here. This gauge features a steel Bourdon



spring and hardened steel working parts. The use of steel alloys in its mechanical construction allows it to stand up under the hardest service and, above all, not give way in case of fire, an ever-constant threat in the oil refinery.

Besides this gauge, the exhibit is featuring new heavy forged-steel orifice meters for safely measuring flows of fluids under high pressures up to 2,500 pounds or 5,000 pounds per square inch. Other instruments announced during the past year and on exhibition are a flow ratio controller for proper proportionment of flows and a differential limit controller for accurately metering the widely varying flows that are so prevalent in the gas industry. There is the usual line of instruments for controlling, recording or indicating temperatures, pressures and flows.

GASO PUMP & BURNER MFG. CO.
64 Oklahoma Building

The Gaso Pump & Burner Manfacturing Co., of Tulsa, in Booth 64, Oklahoma Building, has a miniature model of a Gaso enclosed type duplex piston power pump (Figure 1,508) driven by "V" rope drive and Wagner electric motor. L. D. Armstrong and H. F. Stover are in charge of the booth.

GARLOCK PACKING CO.
59 Texas Building

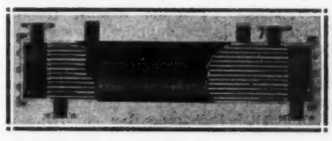
The Garlock Packing Co., Palmyra, N. Y., is showing a complete line of metal and fibrous rod and plunger packings, asbestos and rubber sheet packings, fibrous and metallic gaskets, molded rubber and asbestos goods for every oil producing and refining requirement.

THE GROLIER SOCIETY
49 California Building

The Grolier Society, Kansas City, Mo., publisher of educational books, has on exhibit two sets of books, "The Book of Knowledge," and "The Book of Popular Science." The former set is a children's encyclopedia in 20 volumes which contains more than 30,000 subjects which the child mind can master. The topics are interestingly presented and profusely illustrated. "The Book of Popular Science," a 15-volume set of books, gives the story of all created things and the world they live in, the wonders of modern discovery and the triumphs of inventive genius. Many distinguished scientists have contributed to the pages of this set of books. Both sets of books contain information on oil, gas, etc.

THE GRISCOM-RUSSELL CO.
42, 43 Oklahoma Building

The Griscom-Russell Co., New York, is exhibiting its new Equaflo exchanger. This exchanger is of particular interest to engineers and superintendents of petroleum refineries, natural gasoline re-



covery plants, chemical plants, etc., because of its unique design which eliminates cross baffles in the shells.

In the G-R Equaflo exchanger the tubes are swaged down at one end to permit close spacing of the tubes in the shell and at the same time retain sufficient bridge wall in the tube sheets for strength. As implied by the name "Equaflo," the tubes are so spaced in the shell that the area of flow through the shell may be equal to the area of flow through the tubes, which result is the ideal which has always been striven for by heat exchanger designers.

The Equaflo exchanger is applicable to the efficient heat exchange between two liquids of approximately the same quantities, such as rich and lean mineral seal oil. It is also highly efficient, according to the manufacturers, where conditions permit its use as a condenser or cooler. It is furnished in various arrangements and materials for different service requirements.

GENERAL CHEMICAL & SOLVENTS CORP.
43 Texas Building

The General Chemical & Solvents Corp., Boston, Mass., exhibits noncorrosive finishes in colors which may be applied to any kind of metal and are especially adaptable for gas and oil lines, gas storage tanks, gas pumps, etc. These finishes are guaranteed for a period of five years against fading, peeling, checking, cracking or crazing.

In attendance for the company are Walter C. Martin, president; Frank Weaver, vice president in charge of production; Col. C. H. Crawford, engineer, and Charles E. Jeffrey, special representative.

GENERAL ELECTRIC CO.
76, 77, 134, 135 Texas Building

The General Electric Co., Schenectady, N. Y., occupying Booths 76, 77, 134 and 135 in the Texas Building, is showing the following General Electric equipment: D-57 turbine; Type K-20 horsepower, 1,800 r.p.m., 440-volt totally inclosed fan-cooled Class I motor designed for hazardous gas conditions; CR-7,006 D-5 magnetic switch, inclosed in special Class I cast iron case; double wheel headache post control mechanism; single wheel headache post control mechanism; BTA-10/333 horsepower, 1,650/550 r.p.m., 220-volt motor with pilot motor mechanism; panel with control apparatus for BTA motor; completely assembled BM control for cable tool drilling for MT-75 horsepower, 440-volt motor; CR-2,940-BS-312 BT mercury tube push button station; supervisory control equipment for pumping stations; CR-7,505 A-1 relay

equipped with glass tube and hand cleaner for demonstration with smoke.

The following sales representatives are present: L. T. Blaisdell, district manager, Dallas; R. T. Shiels, industrial manager, Dallas; W. A. Gluesing, Schenectady, N. Y.; J. H. Oliver, Philadelphia, Pa.; Ralph Randall, Oklahoma City; M. E. Montrose, Shreveport, La.; A. W. Sherwood, Amarillo, Tex.; G. R. Prout, Dallas, Tex.; G. W. Curry, Houston, Tex.; R. P. Paden, Abilene, Tex.; J. M. Connor, Odessa, Tex.; P. J. Kranenburg, Wichita, Kans.; A. L. Jones, Tulsa; R. L. Middleton, Tulsa; E. F. Patterson, Tulsa, and F. B. Hathaway, Oklahoma City.

GATES HARDWARE CO.
Open-air Space

The Gates Hardware Co. (wholesale), of Tulsa, has a 20x20 space in the center of the Exposition grounds, on the main walk and adjoining the Exposition office on the north. Many items sold over the Mid-Continent Field are displayed. These include most of the prominent factory brands familiar to oil men, such as, Plumb, Crescent, Trimo, Stacy, True Temper, Disston, Atkins, Lufkin, Nicholson tools and supplies, builders and garage hardware, locks, roofing, American chain, Fox shovels, Eveready flashlights and Sylvania lamps. Items used in production, refining and distribution of oil and including pipe line construction are featured. The exhibit is attended by all the Gates sales staff.

B. G. GOBLE MANUFACTURING CO.
Open-air Space

The B. G. Goble Manufacturing Co., Tulsa, is exhibiting underpull pumping jacks. The lightest weighs 750 pounds, and the heaviest 4,500 pounds. Some of these jacks are equipped with only one bearing of a new type that needs oiling only once a year.

GOODRICH ELECTRIC CO.
41 Refiners and Marketers Building

The Goodrich Electric Co., Chicago, is making a feature of its No-Kon-Bend angle reflector, which can be installed on a straight piece of conduit without a gooseneck or bend and which can be attached or detached without any screws or nuts and without disturbing the wiring. Other products displayed are porcelain enameled reflectors, vaporproof fixtures, floodlights for outdoor spaces, weatherproof lighting fixtures and office lighting fixtures. The company provides reflectors and gasproof fixtures for oil companies and refiners. W. J. Goodrich and A. H. Hardy are in charge.

GLOBE OIL TOOLS CO.
63, 64 California Building

Among the products of the Globe Oil Tools Co., Los Angeles, Calif., featured in its exhibit are the new roller bit and Globe expansion bit, also "B-2" and Model "5" drilling bits, Model "5" drilling reamer, Model "M" rock bit, H. C. Smith coring equipment and rotary underreamer, Anglite and other smaller tools and equipment.

The Globe expansion bit is the newest product of this company, designed to eliminate the need for underreaming. In addition, it is said to have been found that there was another important use where a full-gauge oversized hole was not desired. By eliminating a portion of the reaming head, the side wall friction was reduced to such a point that more footage was accomplished with less weight and faster drilling time.

Demonstrations show the working principle of the "B-2" and Model "5" drilling bits, as well as of the various other products exhibited. These two bits operate on the principle of cutting a core and then destroying it. The assertion is made that these tools cut more easily and straighter, because they lessen resistance of the formation first by making only a small contact with the outermost teeth, cutting a core as the drill rotates and then speedily destroying it, as each succeeding row of teeth enters the formation and slices off its share.

E. H. Wilson, assistant sales manager, is assisted by R. L. Dinger, branch manager in Oklahoma City.

GENERAL PAINT CORP.
38, 39 Texas Building

The General Paint Corp., Tulsa, exhibiting in Booths 38 and 39, Texas Building, is showing its line of protective pipe coatings, mill coated and wrapped pipe and technical paints for the oil industry. General Paint Corp. is showing a number of unique experiments which deal particularly with problems oil and gas men are running into every day. The company announces that within the past year it has developed a number of products which are of more than casual interest to the purchaser of technical paints and pipe line coatings. Several films are shown of recent jobs on which Bitumine pipe line protective coatings have been used.

D. M. Boylan, district manager, Tulsa, is in charge of the exhibit, assisted by W. D. Teubner, assistant to the district manager, and D. W. Boylan, vice president and treasurer of the General Paint Corp., San Francisco, Calif., together with sales representatives.

GUIBERSON CORP.
116, 117 and 118, Oklahoma Building

The Guiberson Corp., Dallas, Tex., is showing two distinctly new specialities.

The Guiberson duplex tubing catcher has been developed to meet the safety requirements of tubing in deep wells. It is designed with a multiple of slips, one set above another, the slips operating in unison and actuated by a common means.

When the Guiberson duplex catcher is used, it is said, the shock occasioned by the fall of a string of tubing is effectually distributed over a much greater area of the casing circumference and the possibility of distortion to the casing reduced to an absolute minumum.

The Guiberson wire line oil saver, a new feature, was designed to reach new heights of efficiency, economy and simplicity of operation. The rubbers are brought together evenly, instead of one at a time, and with equal pressure, insuring, it is said, a perfect pack-off, avoiding uneven rubber wear and prolonging the life of the rubbers. A very handy and desirable feature is the ability to remove the roller caps with their enclosed rollers without disturbing any other part of the saver. Bottom rubbers are made for the express purpose of sealing fluid while the upper rubbers are being changed, a very desirable feature. The crank effort is compounded through worm and toggle arms to the rubbers. The movement of the crank by hand or the mere touch of the crank handle by the toe of the foot is sufficient to pack off against the highest pressures.

The Guiberson high pressure oil saver, developed primarily to handle long strings of tubing on deep wells where pressures are considerably greater than in shallow holes, will also have its premier showing in the Guiberson booths.

GRANGER INDICATOR CO.
64 Texas Building

The Granger Indicator Co., Los Angeles Calif., exhibits the Granger tubing leak indicator, manufactured of cast bronze and accurately machined. It is manufactured in sizes to run in 2, 2½ and 3-inch tubing.

GENERAL MOTOR TRUCK CO.
30 by 80, Lot J

The General Motor Truck Corp. is exhibiting its motor truck especially adapted to oil country usage.

THE HYATT ROLLER BEARING CO.
78, 79 Texas Building

An assortment of Hyatt roller bearings of types and sizes suitable for application to oil-well equipment comprises the major part of the exhibit of the Hyatt Roller Bearing Co., Harrison, N. J. There are shown also an operating model of a Hyatt roller bearing illustrating the positive lubrication features, photographs of actual installations, and designs illustrating construction and application of the bearing. C. L. Newby, sales manager, western division, is in charge of the exhibit. The following men are also in attendance: H. K. Porter, general manager of sales; H. M. Carroll, advertising manager; J. L. Haynes, engineer, western division; F. H. Webster, oil well equipment specialist, western division; J. M. Kelly, sales manager, central division, and L. L. Hill, oil well equipment specialist, central division.

J. A. HARDIN
37 Refiners and Marketers Bldg.

The Burdick Enamel Sign Co., Chicago, and the Press Sign Co., St. Louis, Mo., both represented by J. A. Hardin, Tulsa, are presenting a display of their products in this booth.

The Burdick company's exhibit consists of vitreous porcelain enamel signs. In attendance from this company are George S. Blome, Baltimore, Md., and F. H. Meyer, Chicago.

Steel, duco and glass-framed signs are shown by the Press company, which is represented by Albert Levy, president, and Robert Etzhorn, vice president.

HUGHES TOOL CO.
91, 92 Texas Building

The Hughes Tool Co., Houston, Tex., is exhibiting Hughes Simplex rock bits, core bits, drilling valves and fittings (showing recent development of Hughes 6,000-pound test design valves) and tool joints.

Among improvements embodied in Hughes tools is the Hughes forged lubricator cage for the Simplex rock bit. This is manufactured from chrome nickel steel and is heat-treated. The forged lubricator cage was designed primarily to overcome cutting action of sand-laden flushing fluid. This was accomplished by enlarging the small drilled ports of the previous design into two large ports. The new ports are of so much greater capacity and of such shape that eddy currents within the cage and wash pipe throat are almost eliminated. This lengthens the life of the new cage. The steel forging adds to the strength of the steel and therefore to the finished product. The wide open ports of the forged lubricator cage facilitate handling the Simplex rock bit, as this affords a good eyelet through which to pass cat line or hook.

The core barrel vent of the core bit represents an improvement over the older design time-limit valve, consisting essentially of two parts, vent plunger and vent cylinder. The vent plunger screws into the top of the core barrel and is an easy sliding fit in the vent cylinder. The vent cylinder, made integral with a sub, screws into the top of the working barrel. A rubber packing ring effectively seals against mud leakage. A removable seat and ball with cotter pin retainer are provided to prevent ingress of mud to the core from wall of the hole when lifting core bit from bottom. A strainer, screwed into the bottom of the vent plunger, prevents fouling of ball check and discharge passage ways.

The Hughes core bit plug is simple in construction and easy to operate. It consists only of a mandrel screwed into a steel thimble. When going into the hole, the plug rests on a shoulder in the cutter-head and prevents fouling of core from wall scrapings, bridges and bottom settlings. When the bit reaches bottom, the plug slides up the core barrel ahead of the core, eliminating necessity of flushing the barrel before coring operations are begun.

Included in the exhibit of Hughes cast steel drilling valves and manifold valves is shown the Hughes Drilling-through control master. This is essentially a drilling valve having side outlets and was designed to meet conditions where high gravity oil and gas at high pressures are encountered. Its use decreases the overall height of the christmas tree and eliminates one nipple and two casing threads. Side outlets can be furnished with either male or female thread. Seats have ample clearance and all parts, except the body, are interchangeable with Hughes drilling valves of same size and pressure.

Hughes chrome nickel steel tool joints are included in the exhibit, showing Hughes "Acme" thread, Hughes "V" thread and Hughes A.P.I. thread. The company now is furnishing the trade tool joints of chrome nickel steel in all sizes.

W. C. Morgan, manager of the company's Oklahoma City service plant, is in charge of the exhibit.

HARNISCHFEGER SALES CORP.
6, 7 Oklahoma Building

The featured exhibit of the Harnischfeger Sales Corp., Milwaukee, Wis., is the newly developed P&H pipe hustler, which has drums mounted on the front and two sides of the machine, permitting operation from the most convenient position.

Each drum has three forward speeds and one reverse. When joining a welded section, one drum can accurately lower the butting end of the pipe into alignment, while the end drum can snake the section of pipe along the skids into position.

The P&H pipe hustler also has a "live" boom that can be lowered and raised by power, enabling the pipe to be quickly and accurately centered over the trench without moving the machine. It receives power from a 55-horsepower gasoline motor. Its sturdy P&H tractions travel at the rate of either 5.2, 2.6 or 1.3 miles per hour, enabling it to negotiate virtually all types of ground. It can climb through deep mud, across stumps and other obstructions. It can negotiate slopes of 45° without tipping.

At the booth are R. L. Brown, chief engineer of the pipe line division; C. Powell, district manager, Kansas City, Mo., and J. H. Enochs, district manager, Dallas, Tex.

HERCULES MOTORS CORP.
59, 60, 61, 62, 63, 64, 65 Oklahoma Building

The Hercules Motors Corp. of Canton, Ohio, is displaying its complete line of heavy-duty fours and sixes—including engines and power units specifically developed for oil field application.

Hercules engines on display are 4-cylinder models—OOC, 4"x4½"; TX, 5½"x7"; 6-cylinder model—YXC, 4⅜"x4¾".

Hercules power units include 4-cylinder models: OX, 4"x5"; and OOC, 4"x4½"; 6-cylinder model: YXC, 4⅜"x4¾".

An oil field type of power unit operating on natural gas is Model TXO, 4-cylinder, 6⅜"x7", equipped with the necessary apparatus for operating on this type of fuel.

Another feature of interest will be the Hercules Model OXC engine arranged as a Fordson tractor engine replacement.

Hercules also shows a full line of parts.

R. J. Scott, the Hercules representative in the Mid-Continent oil fields, whose headquarters are in Tulsa, will be in charge of the Hercules exhibit. John Keplinger, L. R. Smith, George W. La Salle, B. F. Affleck and other officials of the company will be in attendance at the show.

HAZARD WIRE ROPE CO.
28 Texas Building

The Hazard Wire Rope Co., Wilkes-Barre, Pa., is showing examples of practically every type of rope manufactured by Hazard. Of particular interest is the Hazard "Lay-set" rotary drilling line which is a development of preformed rope designed especially for service on modern rotary drilling equipment.

THE CHARLES N. HOUGH MFG. CO.
84 Texas Building

Among other items shown by the Charles N. Hough Manufacturing Co., Franklin, Pa., are the Hough brands of specialized balls and seats known to the trade as "Steelex," "Repelex," "Bronzex" and "Combinex"; working barrels of ve-

rious types; seamless steel working barrels and different types of liner working barrels, including the Huf-Duo pump, Lewis plunger liner, 2-cup inserted liner and Thompson pump. There also is shown the Hough extension lower valve, "Protex" upper valve and various types of working barrel valves made of bronze and steel.

C. O. Shumaker, sales representative, Tulsa, is in charge of the booth. C. R. Brooks, sales representative; C. H. Hough, treasurer, and O. J. Thompson, manager, are in attendance.

HAPPY BELTING CO.
72, 73, 74, 75 Oklahoma Building

The Happy Belting Co., Tulsa, shows a complete line of idlers and tighteners for the application of endless belts to oil-field operations. In addition to the automatic band-wheel power idler and the No. 3 vertical tightener for beam wells, the company has its new "E-C" (engine to countershaft) on display. This tightener is to be used where a countershaft is used and makes it possible to use an endless belt for this work.

All of the tighteners are shown in one-quarter size working models and in operation.

HILLS-M'CANNA CO.
99 Texas Building

Hills-McCanna Co., Chicago, is featuring five of its products. Among the proportioning pumps displayed is the Type G Duriron fitted model recommended for feeding sulphuric acid of various concentrations, lime-oil, etc. In this line of pumps there are types made of various alloys for injecting other chemical agents used in the treatment of crude oils and distillates. These pumps are said to have met favor because of their ability to pump against pressures. Their rugged construction embodies guided plungers which maintain the pistons in alignment. The check valves used are a special, easily cleaned type for handling liquids with solids in suspension. Capacities range to 308 G.P.H. under pressures to 4,000 pounds.

Young tank car bottom outlet valves stop losses in transit and at loading racks. Leakage is prevented by a three-point seal. The valves may be installed in any tank car equipped with an outlet leg.

Many types and sizes of Hills-McCanna thermometer and pyrometer protection tubes are shown, including those of No. 45 alloy which, owing to its high coefficient of expansion, permits quick and accurate readings.

Various models of Hills-McCanna force feed lubricators for individual or centrally controlled oiling systems are on display. These units automatically supply oil in definite amounts where and when it is needed. Types from 1 to 60 feeds can be hooked up to give any number of feeds desired.

The Hills-McCanna liquid sampler obtains average, composite samples at three levels of storage tanks and tank cars in one operation. With it light or viscous liquids may be sampled, saving much time, providing accuracy and giving the means of determining what given tanks contain.

Hills-McCanna products also include boiler room necessities such as low-water alarms, fusible plugs, air cocks and many alloy products such as sheaves, gears, bushings, bearings, etc.

The following Hills-McCanna representatives are in attendance: A. H. Noyes, president, and F. R. Grassle, engineer, of Chicago; A. P. Wright of Houston, Tex., and E. A. Soph of Tulsa.

HANLON-WATERS, INC.
102, 103, 108, 109 Texas Building

Hanlon-Waters, Inc., Tulsa, is exhibiting in conjunction with three other equipment houses for which it is representative, namely the Fisher Governor Co. and the Victaulic Co. of America. It is showing the Hanlon-Waters oil and gas separator, a piece of equipment recently put on the market and received with interest by production executives and engineers. The company also is showing filters of the American Air Filter Co., Inc., Louisville, Ky.

HALLIBURTON OIL WELL CEMENTING CO.
Lot D, Open-air Space

The Halliburton Oil Well Cementing Co., Duncan, Okla., is exhibiting on a 30'x30' space on Lot D, open-air space, showing the company's latest cementing equipment and other devices which it manufactures. Outstanding is to be a fully equipped six-cylinder cementing truck in actual operation. Cementers, engineers and chemists are with the exhibit to explain the many phases of cement or drilling fluids and well cementing operations.

Those in charge of the exhibit are H. C. Gloeckler, vice president; A. D. Stoddard, chief engineer, and C. P. Parsons, field engineer, together with superintendents and men from various districts on certain days.

HERCULES TOOL CO.
33 California Building

Oil well specialties displayed by the Hercules Tool Co., Tulsa, include the Hercules tubing-anchor, tubing-hanger, cast-steel casinghead, high pressure forged-steel casinghead, flow head tubing-spider, tubing-rotator, upset pumping and flowing tee and casinghead adapter.

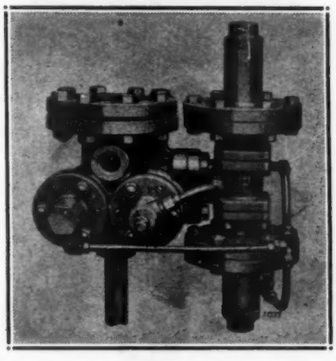
In charge of the exhibit are S. P. Tschappat, general manager; Harold Callahan and Joe Laley.

C. M. HEETER, SONS & CO., INC.
19 Oklahoma Building

C. M. Heeter, Sons & Co., Inc., Butler, Pa., manufacturers of oil and gas well supplies for more than a quarter of a century, are exhibiting packers of many types, corrugated friction sockets, swabs and pipe grips, which have been standard with this company for years, and show for the first time a leakproof, release coupling and an all-steel casinghead. There is also a tool brace, which has just been placed on the market.

INGERSOLL-RAND, INC.
Lot D, Open-air Space

The Ingersoll-Rand Co.'s exhibit is on Lot D, open air space. It consists of a separate building housing a compressor operating the new Ingersoll-Rand "Max-

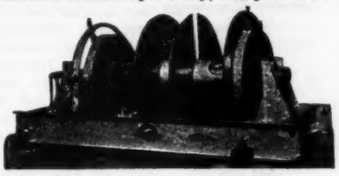


i-flo" oil well flowing device, using gas or air as a medium. The Max-i-flo is an automatic valve controlled by the fluid level within the well. It is said to be applicable to small, as well as large, producers, due to the fact that it greatly reduces the lifting costs by eliminating a large part of the pulling of rods and tubing. In its demonstration at the exposition the device pumps oil from a 6-inch hole 20 feet deep, thus showing its use in oil field work.

THE INTERNATIONAL DERRICK & EQUIPMENT CO.
Open-air Space

Four new products are shown by the International Derrick & Equipment Co., Columbus, Ohio. These are the Ideco type B portable drilling rig, a fast machine designed to meet the conditions encountered in a 3,000-foot well; the Ideco 27½-inch oil-bath rotary, a straight rotary designed for the heaviest drilling service; the Ideco Super Duty four-speed drawworks, for drilling wells 12,000 feet and deeper, and the Ideco 6-inch oil-bath swivel, constructed for heavy duty in deep-well drilling. Each of these is described in detail in the "Oil-Field Equipment and Supplies" department of this issue of The Oil and Gas Journal.

A 122-foot reinforced galvanized structural steel Ideco derrick is equipped with the new Ideco Super Duty, two-post draw-



works; the new Ideco 27½-inch oil-bath rotary; rotary headboard; 72-inch streamline traveling block; Ideco heavy-duty straightline crownblock; the new Ideco oil-bath swivel; the water-cooled sand reel; the Union-Ideco XX Heliflex oil-field chain and Cal-Well products, consisting of Cal-Well weight and Cal-Well Gel. All of this equipment has been designed for deep well drilling.

In addition to the foregoing 10,000-foot drilling outfit the company has on display the latest developments in its drilling and pumping units, including the Ideco chain rig and Ideco geared unit. There also are shown the new reversible jackshaft, the all-welded inverted-type steel walking beam, the newly designed pitman, tubing catcher and an Ideco standard building.

The display includes the underslung or inverted type Ideco all-welded walking beam recently placed on the market, the construction of which is said to minimize the depth of the arc described by the end of the beam during the stroke, and consequently to reduce the horizontal displacement of the polished rod, and the Ideco reversible jackshaft which is finding widespread favor in the industry for driving, drilling and pumping rigs and other items of machinery. This jackshaft is designed for use with internal combustion engines or any non-reversible engine or electric motor.

Among those in attendance from the company are R. R. Bloss, C. G. Runkle, B. Boykin, Jr., F. W. Mohler, W. T. Hazel, J. L. Hamilton, Foster Leidecker, S. B. Creamer, H. L. Wixfort, John A. Tidball, and C. M. Powell.

INTERNATIONAL FILTER CO.
48, 49 Oklahoma Building

The International Filter Co., Chicago, is exhibiting an Infilco lime and oil feeder and mixer which automatically feeds and proportions hydrated lime and oil to

the mixer where a homogeneous mixture is made for continuous pumping to the cracking stills to prevent corrosion. In addition there are displayed a "cut-away" Crystalite water softener and various types of Infilco steam purifiers and line type gas purifiers.

INTERNATIONAL HARVESTER CO.
Open-air Space

The International Harvester Co., Chicago, has on display its new Model A-5, 3-ton, six-cylinder fast truck, equipped with propeller shaft power takeoff, Braden steel winch, and oil-field body; also an A-4, 2-ton, with propeller shaft takeoff, equipped with rear winch for pulling rods and tubing. The new AL-3, 1½-ton truck, is shown equipped with 1,000-gallon Columbian tank on semi-trailer.

The exhibit is in charge of R. W. Elliott, Tulsa manager, assisted by S. C. Humbert, J. W. Leitenberger and R. L. Adams.

IVERSON TOOL CO.
51, 52 California Building

Five oil-field appliances are shown by the Iverson Tool Co., Tulsa.

The new Hamer seven-joint all-steel rotary hose is made with seven flexible ball-bearing joints, each one having a fluid channel larger than the 3½-inch drill pipe which connects the joints. The hose can be placed in any position in the derrick without binding or causing stress on the hose or drilling equipment. Due to the unusual construction of the joints the cutting action is reduced to a minimum, so the hose will outlast any hose on the market today.

The Hamer lubricated stopcock is so constructed that Alemite tips or Alemite fittings are provided to lubricate the plugs. It has the additional feature of using a tension spring at the bottom to keep the same pressure on the plug at all times.

Hamer E-Z out liner sleeves are made to go on the outside of mud pump liners to pack off the liner in the pump. They are in two pieces of graphited rubber, one inside the other, and after the sleeve has been in the pump a long time it will allow the liner to be pulled without difficulty because of being constructed in two pieces. The graphited surfaces do not stick together, and allow one of the liner rubbers to come out with the liner and the other one to remain in the pump, where it can be removed easily after the liner is out.

The outside of the Hamer E-Z out valve seat is made with thin hard rubber ring which, when placed in the pump, takes up any irregularity due to seats having been forced into the pump and any other irregularity, and makes a perfect pack-off in the pump. When it is desired to remove the valve, it can be done easily as the graphited rubber does not stick to the pump.

The Taylor-Mildren wire line clamp embodies several new features. One is the manner in which the gripping pressure is applied to the line. This is obtained by means of the toggle joint principle. A toothed projection on the back of each movable jaw virtually gears the two jaws together in such a manner that when either jaw is opened or closed the other jaw moves in the corresponding direction. This feature prevents slipping one jaw ahead of the other and fouling the line.

S. M. JONES CO.
18 Oklahoma Building

The S. M. Jones Co., Inc., Toledo, Ohio, is exhibiting in Booth 18 of the Oklahoma Building. The exhibit consists of the Jones sucker rods with a moving picture illustrating the construction of the rods. In attendance are P. C. Jones, president; D. R. Dale and Frank Stritmatter, engineers, all of Toledo and the following zone representatives: C. A. McClure and W. E. Harvey, Oklahoma; W. C. Meeks, Kansas; L. J. Pundt, Houston, Tex.; S. L. Carter, Fort Worth, Tex.; J. G. Litherland, Louisiana; Holt McWorkman, Midland, Tex.; M. P. Reynolds, Amarillo, Tex., and A. L. Meeks, western manager.

JONES & LAUGHLIN STEEL CORP.
12, 13, 14, 15, 16 Oklahoma Building

The Jones & Laughlin Steel Corp., Pittsburgh, Pa., is exhibiting J & L double-length line pipe, J & L A.P.I. seamless casing, J & L upset seamless drill pipe, J & L plain A.P.I. tubing, J & L seamless upset tubing and a sample board showing the various tubular products manufactured by Jones & Laughlin. There also are shown complete sets of materials representing the progress in making J & L casing and tubing. A feature of the background employed by J & L are two original oil paintings made in the J & L works in Pittsburgh and Aliquippa, Pa., one depicting the open hearth and the other showing the Bessemer converters.

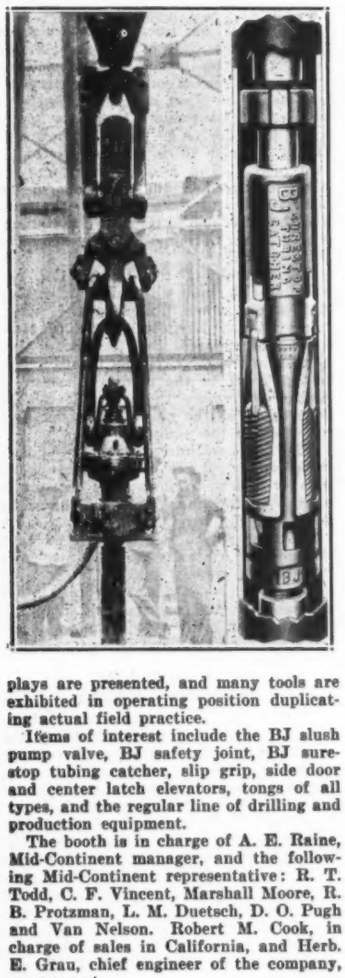
Among those representing J & L at the exposition are F. D. Grunder, manager of tube sales; A. E. Crockett, manager of the bureau of instruction; J. Z. Collier, assistant general manager; J. H. Sennett, superintendent of the welded tube department; H. E. Fisher, superintendent, seamless tube department; W.

R. K. Scott, inspection department; Alex Milne, inspection department; H. L. Miller, district sales manager, St. Louis, Mo.; J. B. Hungate, district sales office, St. Louis; H. P. Quinn, field representative, Tulsa; A. P. Holloway, field representative, Fort Worth, Tex., and Carl E. Swindler, field representative, St. Louis.

BYRON JACKSON CO.
Open-air Space

The exhibit of the Byron Jackson Co., Los Angeles, Calif., housed in a tent located between the Scientific and Technical Building and the Refiners and Marketers Building, includes the complete BJ line of tools for drilling and production.

The new BJ Triplex hook is given its first public showing. Several moving displays are presented, and many tools are exhibited in operating position duplicating actual field practice.



Items of interest include the BJ slush pump valve, BJ safety joint, BJ surestop tubing catcher, slip grip, side door and center latch elevators, tongs of all types, and the regular line of drilling and production equipment.

The booth is in charge of A. E. Raine, Mid-Continent manager, and the following Mid-Continent representative: R. T. Todd, C. F. Vincent, Marshall Moore, R. B. Protzman, L. M. Duetsch, D. O. Pugh and Van Nelson. Robert M. Cook, in charge of sales in California, and Herb. E. Grau, chief engineer of the company, are present.

JACKSON ENGINEERING CORP.
94, 95, 96 Oklahoma Building

The Jackson Engineering Corp., Tulsa, is exhibiting absorption and vapor recovery plant equipment. Working models, prints, photographs, and a complete description of many new refinements in process equipment are shown.

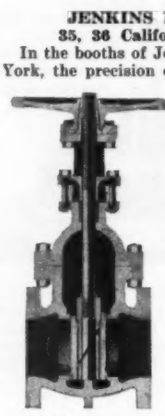
In conjunction with this exhibit the Fluor Corp., Ltd., Los Angeles, Calif., shows a new model redwood cooling tower with sections in detail. Of particular interest to refiners is a motor-driven model of the "Unipulvo" pulverizer, a unit designed for utilization of petroleum coke for boiler feed.

INDEPENDENT OIL & GAS CO.
18, 19 Refiners and Marketers Building

The Independent Oil & Gas Co., Tulsa, is exhibiting in window-show fashion its products and service. The most prominent thing in the display is the "Big Blue I" in the red seal, together with the petroleum derivatives for which it stands.

JENKINS BROTHERS
35, 36 California Building

In the booths of Jenkins Brothers, New York, the precision construction of Jenkins valves is shown by a series of aquatint etchings made by Donald Douglass. These etchings form the background to a display of Jenkins iron and bronze valves, in standard, medium and extra-heavy patterns. Prominently placed are quarter-section cuts of the new Jenkins iron-body double-disc parallel seat gate valves. Strength to withstand varying pressures and temperatures, expansion and contraction, weight of piping and stresses due to settling, is characteristic of this new valve, according to the manufacturers.



Sectional view Figure 879. O. S. & Y. flanged.

The upper spreader, which is secured to the spindle, and the lower spreader, which is free to slide on the inclined surface presented by the upper spreader, fit into recesses on the discs. Held together by guide ribs inside the valve body, these spreaders are said to form a compact and efficient wedging mechanism that reduces friction to a minimum and assures a true, tight fit under all conditions of service.

JENSEN BROTHERS MANUFACTURING CO.
Lot F Open-air Space

The exhibit of the Jensen Brothers Manufacturing Co., Coffeyville, Kans., consists of a No. 14 Jensen straight lift electric pump jack equipped with a multiple V-belt drive and 10 horsepower motor. This machine is capable of pumping 3,000 feet of 2-inch tubing with a 42-inch stroke. It was introduced to the oil field last spring and is said to have set several records for trouble-free and economic operation. Its simplicity, easy starting and stopping, quiet running and its capability are important features, according to the manufacturer.

The exhibition is in the hands of W. G., K. R. and E. H. Jensen, of Coffeyville and Tulsa.

KEYSTONE DRILLER CO.
Lot M, Open-air Space

The Keystone Driller Co., Beaver Falls, Pa., is exhibiting its new No. 9 all steel spudder, which has been under development for the past two years. The outstanding features of the machine are its all-steel construction, half-crawler mounting, and the dual cushion shock absorber which makes the machine usable with wire line. The unit is powered with a 70 horsepower six-cylinder Waukesha engine, and is intended for use to a depth of 2,500 feet. The cable reel has capacity for 3,000 feet of cordage. The machines will be carried in stock at the Joplin, Mo., warehouse of the company for shipment into the Middle West Field.

KLENZMOTOR CORP.
53 California Building

The Klenzmotor Corp., Fort Wayne, Ind., has a complete display of its latest design electrically operated automotive cleaning machines. It also displays its new electric heating unit and partial assemblies of special parts of its equipment. This display introduces a new apparatus and service for thoroughly washing out crankcases, transmissions and differentials before refilling them with new oils or greases. Klenzmotor is of interest to the marketer.

KELLOGG SWITCHBOARD & SUPPLY CO.
7 Scientific and Technical Building

The Kellogg Switchboard & Supply Co., Chicago, shows and demonstrates all the essential material for the construction and operation of good telephone communication in the petroleum industry. The Kellogg company manufactures telephone equipment especially designed for oil field use. Its offices and warehouses are established in Chicago, Dallas, Kansas City, Los Angeles, Minneapolis, Columbus and San Francisco, where sales and service organizations are maintained.

H. M. Stewart and C. G. Gardner, Kellogg representatives, are in attendance to offer engineering advice on all telephone problems.

KEMPER-THOMAS CO.
11 Texas Building

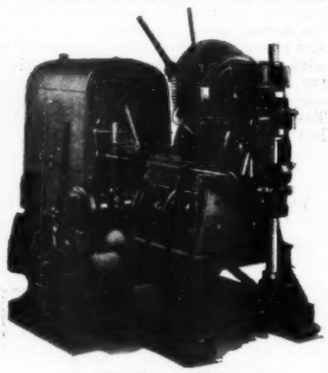
The Kemper-Thomas Co., Cincinnati, Ohio, is exhibiting various forms of speciality advertising especially adapted to the oil industry, including calendars and novelties, cloth caps and other items for safety campaigns; leather specialties, and holiday greetings. It features the Barker patented outdoor sign for general distribution.

The booth is in charge of C. H. Weier, director of Barker sign sales; R. J. Bernard, general sales manager; O. M. West, Midwest division manager, and E. H. Sieberg, Southwest division manager.

E. J. LONGYEAR MANUFACTURING CO.
Lot G, Open-air Space

The E. J. Longyear Co., Minneapolis, Minn., is exhibiting two new core drilling units designed for rapid structure drilling.

The Longyear Rotacore is a self-contained mounted machine equipped with rotary table and hydraulic feet and having a drilling capacity of 3,000 feet of N core 2⅛ inches in diameter. The Rotacore is now in successful operation in different sections of the Mid-Continent Field.



U. G. gas drill.

Rotacore drill.

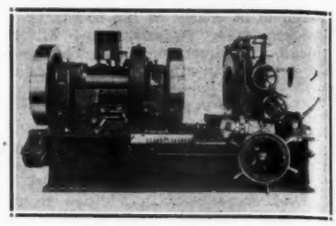
The Longyear UG gas drill is complete with both hydraulic and circulating pump. It is powered by a Ford Model A and mounted on a compact steel frame, the entire outfit being readily portable by truck. The capacity is 600 feet of 1⅛-inch core or 750 feet of seven-eighths-inch core.

THE LEAVITT MACHINE CO.
16 California Building

The Leavitt Machine Co., Orange, Mass., is displaying the complete line of Dexter vale reseating machines. These machines are made for reseating globe valves, gate valves and for refacing pump valve seats. New equipment includes the Dexter machine for reseating tank car outlet valves. Machines in operation are shown at the exposition. The B.&A. Specialty Co. is in charge of the exhibit, assisted by E. S. Hersey of the Leavitt Machine Co.

LANDIS MACHINE CO.
4, 5 Oklahoma Building

The Landis Machine Co., Waynesboro, Pa., has developed a pipe threading and cutting machine with a receding chaser two-cut die head and lead screw attachment which it is exhibiting in Booths 4 and 5, Oklahoma Building. The receding chaser feature is said to add materially to the accuracy and economy of the machine. The die head is a two-cut head which permits of the roughing and finishing cuts without any change in the diametrical adjustment. The taper mechanism is said to be an exclusive design generating a taper which is absolutely uniform the entire thread length. The lead screw attachment with change gears for the different pitches is said to insure a perfect start of the thread and an accurate lead. The accompanying picture shows the 8-inch pipe threading and cutting machine.



LELAND EQUIPMENT CO.
Lot C, Open-air Space

The Leland Equipment Co., Tulsa, is showing a wide variety of oil field equipment, including Models 35 and 25 Parsons ditching machines, Type "R" Insley crane, Insley backfilling machine, C. H. & E. Manufacturing Co.'s Gold Digger ditcher, C. H. & E. diaphragm pump, 120-foot Schramm air compressor and 300-ampere Schramm electric welding machine. There are also rock drills and paving breakers from the Cleveland Pneumatic Tool Co., hose, steel and accessories and a Homelite pump.

Practically all of this equipment is used in pipe line construction work.

THE LUNKENHEIMER CO.
130, 131 Oklahoma Building

The Lunkenheimer Co., Cincinnati, Ohio, is showing its regular line of bronze, iron-body bronze mounted, all-iron and steel globe, angle and gate valves, including sectioned samples of Figure 1,430, Standard I.B.B.M. gate valve; Figure 1,436, extra heavy I.B.B.M. gate valve; Figure 1,499 and Figure 1,500, steel gate valves. The new Lunkenheimer lubricated rotor valve is also on display, as well as samples of grease cups, oil cups, lubricators and bottle oilers.

One of the features of the exhibit is Lunkenheimer boiler mountings suitable for 350 pounds W.S.P. This will include the following: 2-inch Figure 1,482 set at 350 pounds, bronze pop safety valve; three-quarters-inch Figure 1,284 "Renewo" gauge cock; one-half by three-quarter-inch Figure 1,332 nonautomatic water gauge; 2½-inch Figure 1,512, steel "Duro" blowoff valve; 1½-inch Figure 624, bronze swing check valve; 1½-inch Figure 1,451, steel globe valve; 1½-inch Figure 1,472, steel angle check valve; 1½-inch Figure 1,598, steel swing check valve, and 1½-inch Figure 16, bronze "Renewo" globe valve.

Harry A. Burdorf is in charge of the exhibit, assisted by H. P. MacGregor, J. A. Waldeck, M. N. Stickel and E. k. Tieberman.

LEEDS & NORTHRUP CO.
59, 60 Scientific and Technical Building

Leeds & Northrup Co., Philadelphia, at Booths 59 and 60 Scientific and Technical Building, are exhibiting indicating, recording and automatic temperature control instruments, particularly adaptable to the petroleum industry. The display includes a fully automatic anticipating balancing recorder controller that maintains the temperature of a fractionating tower within 1° to 2° of the desired temperature; the de-Florez temperature controller, a new development for automatically controlling oil outlet temperatures of cracking units and pipe

stills; a recording instrument for determining the propane and butane in air mixtures, which instrument, it is said, can also be made to automatically control a volume of gas by proportionally opening and closing a valve. Boyd F. Koepke, Tulsa representative, is in charge of the exhibit.

LINK-BELT CO.
85, 86 Texas Building

The Link-Belt Co., of Indianapolis, Chicago and Philadelphia, is exhibiting its various rotary chains for drilling, including the Hyper chain recently announced. In addition it shows a model of the Link-Belt vibrating screen for screening rotary shale mud.

Photographs of installations, samples of these chains and silent chain drives and speed reducers are exhibited.

Charles E. Markey is in charge of the exhibit. Others present are Charles Weiss, chief engineer, Indianapolis works; H. C. Wallace and George Howson, field representatives; C. W. Spalding, sales manager, Ewart plant, Indianapolis; E. G. Wendell, Dallas representative; George P. Torrence, vice president of the Ewart works; and F. S. O'Neil.

LUFKIN FOUNDRY & MACHINE CO.
112 Oklahoma Building

The Lufkin Foundry & Machine Co., Lufkin, Tex., is showing its new pumping unit employing the Sykes-Herringbone type of gearing. This gear is said to be strong, efficient and silent in operation owing to continuity of tooth contact peculiar to this type of gearing. It provides the maximum contact for a given width of face and back lash is practically impossible, according to the company. Bearings in the new unit are antifriction throughout, with Hyatt roller bearings in the pinion shaft.

THE LINCOLN ELECTRIC CO.
Open-air Space

The Lincoln Electric Co., Cleveland, Ohio, through the Big Three Welding & Equipment Co. of Tulsa, Fort Worth and Houston exhibits two new series of arc welders, particularly designed for pipe line welding, with the modern high-speed electrodes manufactured by the Lincoln Electric Co. These machines are 400 ampere continuous gas engine driven units and 600 ampere continuous gas engine driven units. These are shown in actual operation, using Lincoln's new Fleetweld electrode.

The exhibit is in direct charge of C. K. Rickel, vice president and general manager of the Big Three Welding & Equipment Co., Fort Worth, Tex., assisted by A. F. Davis, vice president of the Lincoln Electric Co. and H. A. Webb, district manager for the Big Three in Tulsa.

MULTI-METAL WIRE CLOTH CO., INC.
56 California Building

The Multi-Metal Wire Cloth Co., Inc., New York, exhibits a complete line of wire cloth and metallic filter cloth used in petroleum refineries. These embrace square-mesh cloth from four meshes to 400 meshes per linear inch, and metallic filter cloth up to 1,000 wires per linear inch. The following metals are included: Brass, copper, phosphor-bronze, steel, pure Swedish iron, aluminum, Everdur, pure nickel, Monel metal and Enduro KA2. These screens are used on gray towers and in vapor phase cracking, percolating filters, contact filtration and flame arresters.

Multi-Metal screens are said to have made unusual duration records on sour crude, and especial attention is called to the screens of Enduro KA2, lately introduced, which are especially resistant to hydrogen sulphide, even under very high temperatures. The company maintains a special service department which fabricates sectors for gray towers, complete blankets of any size for percolating filters and covers filter presses of any type.

Frederick Stern and Lloyd M. Hopkins are in charge of the exhibit.

MIDLAND CHAMBER OF COMMERCE
13 Arcade

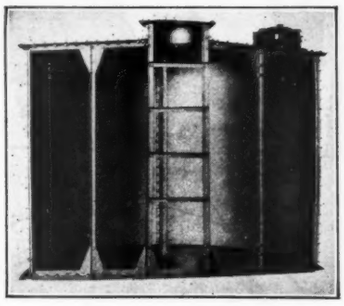
Midland, Texas, the city which originated the idea of a town exhibit at the International Petroleum Exposition, has its fourth annual display this year, in charge of Paul T. Vickers, secretary of the Midland Chamber of Commerce.

Midland shows a huge map of Texas and Oklahoma, depicting Midland and Tulsa as the two chief oil cities of the Mid-Continent. In addition to this map is a rig reading: "Midland—the Tulsa of West Texas." Other signs call attention to Midland's leadership as the oil city of the Permian Basin of West Texas and eastern New Mexico from the standpoint of proximity to the fields, good roads, good hotels, fine offices, modern city conveniences, and schools of the highest standing in the Permian Basin.

Pictures of Hotel Scharbauer, the 12-story Hogan Petroleum office building, 6-story Midland General Hospital, $150,000 Hughes Tool plant, and other scenes are exhibited.

MALONEY TANK MANUFACTURING CO.
Booth 14, Refiners & Marketers Building

In Booth 14 of the Refiners & Marketers Building, the Maloney Tank Manufacturing Co. has a cross section model of one of its vapor pressure tanks. This



shows the reinforcement on the inside seams of the top and bottom and the reinforcing stays, heavily gussetted at each end.

They will also have on exhibit in the booth their new combination thief hatch and vacuum pressure valve.

Adjacent to the Refiners & Marketers Building on the east is the automatic pipe line pump station. The Maloney Tank Manufacturing Co. has furnished in this exhibit two 250-bbl. tanks. These tanks are of No. 12 gauge Keystone blue annealed sheets, with one-half inch bolts throughout in all seams, the bolts being of 90,000-pound tensile strength and manufactured under the new Smith heat treating process.

The tanks are painted aluminum, and one of the new combination vacuum pressure valve and thief hatches is installed in each of the decks.

MARTIN & SCHWARTZ, INC.
54 Refiners and Marketers Building

The new positive displacement double piston type meter pump recently announced by Martin & Schwartz, Inc., Buffalo, N. Y., is shown by that company. This new pump is similar in appearance to the regular M & S meter pump and incorporates all the features of M & S construction with the exception of the meter, which is the new Universal positive displacement meter.

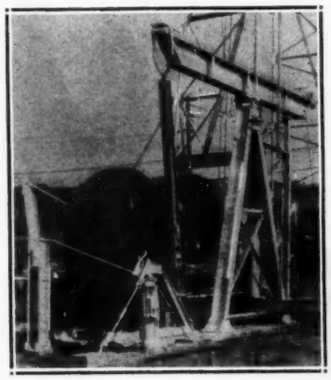
Martin & Schwartz assert that maintenance is practically eliminated by the use of this meter, and that errors in the dispensing of gasoline by the Universal positive displacement meter are practically unknown. They assert that gasoline cannot pass from the storage tank to the customer's car without being accurately recorded. According to an official of Martin & Schwartz, it eliminates costly and untraceable losses now charged to evaporation and leakage. The customer gets exactly what he pays for and the filling station operator gets paid for exactly what he dispenses.

The meter has only two moving parts in the measuring chamber—the pistons. As these pistons move backward and forward by the filling and emptying of the cylinders, they operate three gears in the top plate of the meter, which in turn revolve the dial on the front of the pump. Besides the meter, the pump has other new features, including a solid- nonpulsating pumping unit.

In addition to the meter pump, Martin & Schwartz also display their new price register.

LEE C. MOORE & CO., INC.
65, 66 Oklahoma Building

Lee C. Moore & Co., Inc., steel derrick and rig manufacturers of Pittsburgh, Pa., and Tulsa, have two new all-steel rig fronts, known as Types 90 and 91. These are of the "A" frame type and are braced and welded to give ade-



Type 90 steel rig front

quate strength under severest conditions.

On the exposition grounds are two recent models of Moore Champion derricks. One of these is of 122-foot height and the other 87 feet. In the Moore booth is a miniature Champion derrick. This model, a replica of the derrick itself, shows the Moore type of construction, and the special features of the Champion derrick.

Lee C. Moore & Co. representatives in attendance are C. L. Henry, chief engineer, Pittsburgh; H. J. Woolslayer, assistant chief engineer, Tulsa; G. A. Holloway, district manager, Wichita, Kans.; E. S. Anderson, district manager, Tulsa; W. H. Payne, district manager, Dallas, Tex.; J. E. Harrell, district manager, Shreveport, La.; J. C. Donaldson, representative, Wichita Falls, Tex., and O. H. Dittmer, representative, Tulsa.

THE MEDART CO.
12 Texas Building

The exhibit of the Medart Co., St. Louis, Mo., features several new items in the company's line of power transmission machinery applicable to the oil industry, outstanding among which are sheaves for V-belt drives for any type of V-belt and the Medart Timken-equipped self-aligning pillow-blocks with wedge adjusting heavy oil field base plates. The latter are used as outboard bearings in connection with gas engines for pumping oil wells. Both devices are designed to add efficiency and reduce maintenance costs.

The company is showing also its heavy duty Hercules oil field pulleys, various types of cut gears and flexible couplings. W. G. Kessling is in charge.

MODERN ENGINEERING CO.
93, 94 Texas Building

A display of Meco welding and cutting equipment, some of it in action, is featured by the Modern Engineering Co., St. Louis, Mo. The company is showing too, its special Type X Super pipe line welding torch and flame.

There is a display of Meco multi-seat regulator with the check valve in it. This safety device, attached to the regulator, has not been shown before. It is said to eliminate possibility of ruining the interior of the oxygen regulator, hose or low-pressure gauge.

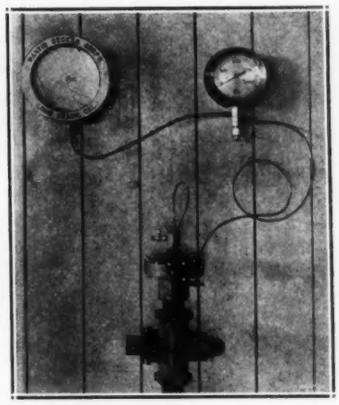
Representatives of the company present are: A. J. Fausek, vice president; I. F. Fausek, general sales manager, and John J. Keane, territorial sales manager.

MID-CONTINENT PETROLEUM CORP.
28, 29 Refiners and Marketers Building

Diamond petroleum products are the featured display of Mid-Continent Petroleum Corp. in its exhibit spaces 28 and 29 in the new Refiners and Marketers Building. A new and novel scenic background and unique lighting effects have been developed for Mid-Continent's display. Diamond 760 motor oil, NevrNox Ethyl Gasoline, Diamond gasoline and other products in the Diamond line are exhibited. Two tests showing qualities of Diamond 760 will be carried on constantly. One thousand copies of "The Diamond," Mid-Continent's house organ for employes and the trade, will be distributed during the exposition.

MARTIN-DECKER CORP.
68 Texas Building

The Martin-Decker Corp. will occupy the same booth as last year, 68 Texas Building. The company's regular equipment will be exhibited, namely, the automatic, recording weight indicator with supersensitive Vernier gauge; the new vertical steel box for mounting the gauges at the brake in front of the draw works; the Martin-Decker pump dyna-



mometer; Martin-Decker pull rod dynamometer, and for the first time the Martin-Decker automatic recording mud scales, nonclog and mud pump gauge, and the Martin-Decker temperature bomb.

The company considers that the most important recent development in rotary drilling is the new mud scales which permits the driller at all times to glance at the dial in order to find the weight of his drilling fluid. The operating department is furnished with a chart record every morning of the weight of the mud throughout the 24-hour period.

It is said to be almost universal practice to use a mud pump gauge on the slush pumps and to keep a chart record of the changes of mud pressures. The men in charge of operations are enabled to check the operation of the pump with reference to the length of time it has run, the pressures it has been running against, how long it has been shut down for repairs and how long it has been run in bad condition.

MacCLATCHIE MANUFACTURING CO.
110 Oklahoma Building

The new MacClatchie all-steel rotary hose and the new MacClatchie automatic water-feed regulator for boilers are exhibited for the first time by the MacClatchie Manufacturing Co., Compton, Calif.

Salient features of the MacClatchie hose, according to the manufacturers, include maximum flexibility under highest pressures, unobstructed flow with no sharp bends, leak-proof and low upkeep cost. Each swivel joint is identical with the rest, being made up of hardened nickel steel, with hardened steel balls to insure minimum friction, and with Alemite lubrication.

The boiler regulator is entirely automatic in its action, designed to insure a constant water level under all circumstances. It is simply constructed and easily installed. The expansion and contraction of a Tobin bronze tube controls

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The GUIBERSON CORPORATION
Box 1106, Dallas, Texas
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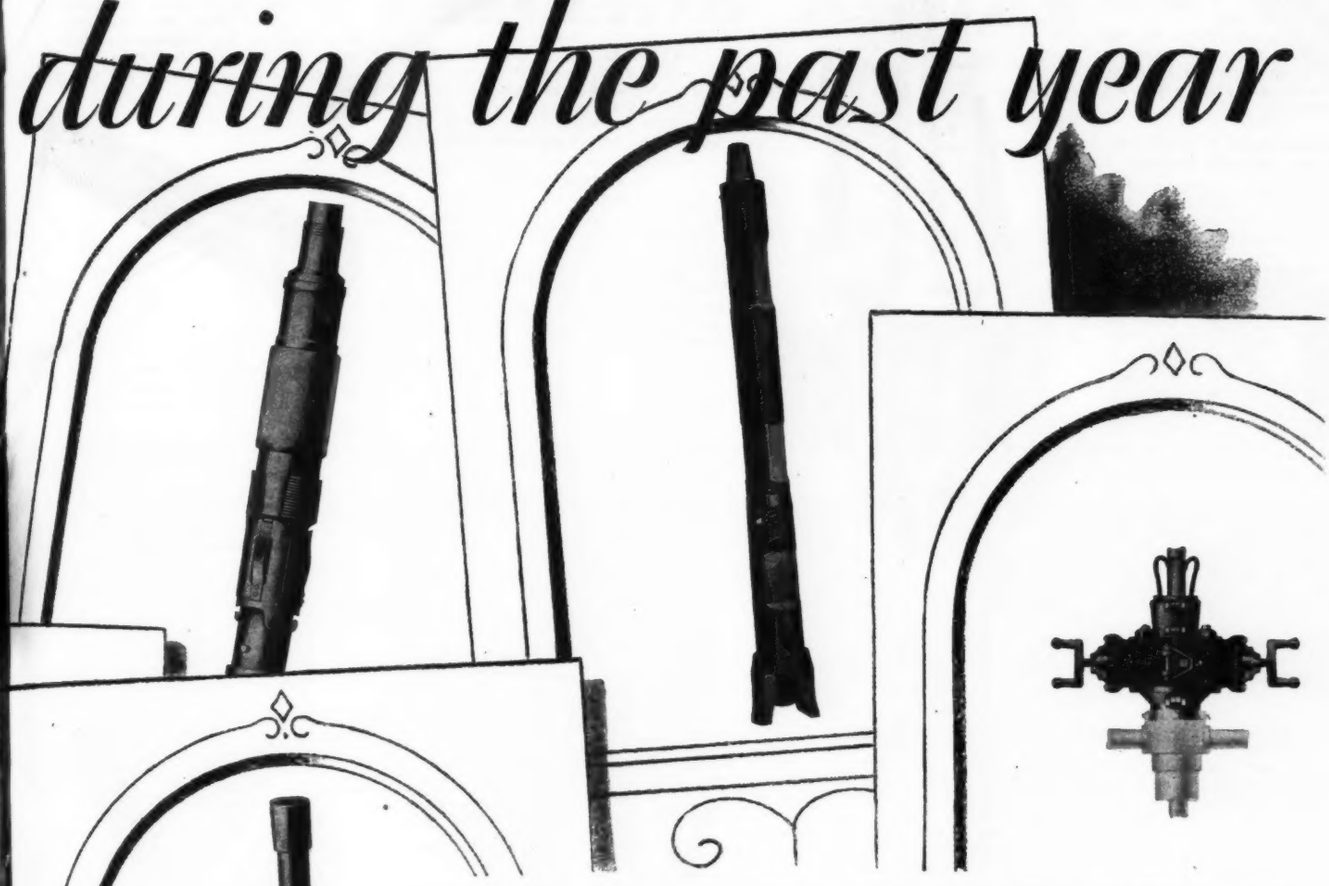
321 S. Osage Ave., Ponca City
506 Trust Bldg., Newark, O.

reviving memories of during the past year



THE GUIBERSON EXHIBIT

BOOTHS 116, 117, 118 OKLAHOMA BUILDING

★ WITH THESE IMPORTANT ADDITIONS SCHEDULED FOR GREAT PERFORMANCE

GUIBERSON DUPLEX CATCHER. Developed to meet the safety requirements of tubing in deep wells. Designed with a multiple of slips, one set above another, the slips operating in unison and actuated by a common means. By this method the shock occasioned by the fall of a string of tubing is effectually distributed over a much greater area of the casing circumference than is possible with a single headed Tubing Catcher and the possibility of distortion to the casing reduced to an absolute minimum.

GUIBERSON WIRE LINE OIL SAVER. New heights of efficiency, economy and simplicity of operation. Rubbers brought together evenly and with equal pressure, insuring perfect pack-off, avoiding uneven rubber wear and prolonging life of rubbers. Removable roller caps and rollers, removed without disturbing any other part of saver. Bottom rubbers seal fluid while upper rubbers are being changed. Mere touch of the crank handle by the toe of the foot is sufficient to pack off against the highest pressures.

GUIBERSON HIGH PRESSURE OIL SAVER. Developed primarily to handle long strings of tubing on deep wells where pressures are considerably greater than in shallow holes.

SEE THEM AT OUR EXHIBIT

GUIBERSON

BETTER BE SAFE THAN SORRY

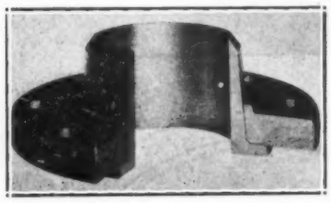
the flow of water into the boiler through the movement of a balanced piston. There are no gaskets and no slides.

Other MacClatchie specialties exhibited include the geared brake for drawworks, mud pump valves, automatic safety cathead, cementing combination, stopcocks and quick unions, flow nipple and beans, pump liner puller and valve seat puller, and the automatic expansion rotary underreamer. Parts and pictures of the MacClatchie "Panther," L-head radial engine, are also on display.

MacClatchie representatives at the show are A. O. Nelson, Mid-Continent manager, with headquarters in Houston, Tex.; J. F. Fowler, Jr., Charles T. Okey and C. F. Whaley.

MERCO NORDSTROM VALVE CO.
39, 40, 65, 66 California Building

The Merco Nordstrom Valve Co., San Francisco, Calif., is bringing out a new type flanged joint, the Merco swivel flange, which is featured in the com-



pany's exhibit. It has been developed for use in connection with welded pipe lines where a flanged joint is required to provide for the insertion of valves and fittings or the taking off of outlets. The Merco swivel flange consists of a drop-forged steel flange fitted to a drop-forged, tapered nipple on which the flange may be rotated, permitting the alignment of bolts, etc. The tapered nipple which is drop-forged from a solid steel billet permits of a design which incorporates much greater than pipe thickness at the base of the nipple where the highest stress occurs and which being formed completely at the proper forging temperature eliminates possible fracture of the metal during the forging operation. By thus forging from the solid billet, sufficient heat may be stored up in the steel to permit the operation being finished at the proper forging temperature. At the same time the flange retains flexibility.

The Merco offers an additional advantage where the service requires a special alloy, such as the new chrome-nickel steels. In this case the tapered nipple only is forged from the alloy, while the flange may be forged from ordinary steel, thus permitting a highly efficient, though less costly, flanged joint. The tongue and grooved type of construction may also be incorporated when desired. The flange can be furnished with pipe nipples of varying lengths welded on before leaving the factory. Cut-away models are shown.

MAHAN, McCARTY & BESSE, Inc.
30 California Building

Mahan, McCarty & Besse, Inc., rig builders, Tulsa, are not offering any exhibit, but are making their booth a meeting place for business friends.

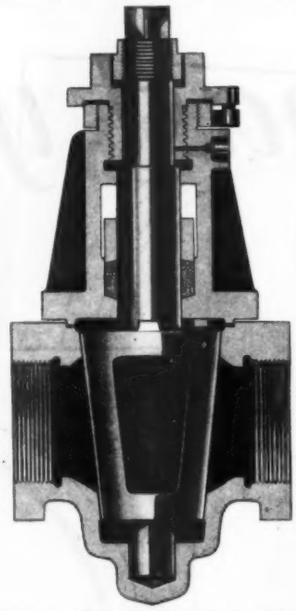
McCAMPBELL & CO.
55 Refiners and Marketers Building

McCampbell & Co., New York, are showing a complete line of various type garments made up for filling station attendants. The majority of these goods are in the new indelible finish and guaranteed fast color, even when laundered under severe conditions. The garments are shrunk by a new process which is said to eliminate all objectionable shrinking.

The garments shown have been made up to match the color schemes of the many oil companies in the retail business, with lettering on the back indicating the name of the company. McCampbell & Co. have been working for months to develop this field and have had a number of the companies standardize on uniforms for their men. The exhibit is in charge of Robert S. Dempsey and Kenneth Rogers.

MICHIGAN VALVE & FOUNDRY CO.
11 Oklahoma Building

The "screw-lift" plug valve, in which the plug is lifted and seated mechanically by the direct action of a simple screw, is shown by the Michigan Valve & Foundry Co., Detroit, Mich. The positive action of this mechanism is entirely independent of line pressure or indirect lubricant



pressure. The strength of the moving parts is said to preclude danger of breaking, even under severe field service. The manufacturers say that on a 2-inch valve a force of 4,500 pounds exerted by a 50-pound pull on an 18-inch wrench may be used to either unseat the plug or force it into its seat without jeopardizing any part in the valve assembly.

The plug, when raised, due to the substantial bearing above the plug and the pilot bearing below, is held just out of contact with its seat regardless of operating pressure. The clearance between plug and seat in this position is just sufficient to permit rotating the plug, but is not enough to permit the entrance of foreign matter or scale between the contact surfaces. No rotation of the plug can take place until the plug is raised out of contact with its seat. Thus, there is no scoring or wear effected in the close metal-to-metal contact between plug and seat. The "screw-lift" valve is furnished either with or without lubrication of the plug, depending on the nature of the service it is to encounter.

MINE SAFETY APPLIANCES CO.
34 Scientific and Technical Building

The Mine Safety Appliances Co., Pittsburgh, Pa., shows a complete line of safety equipment for the petroleum industry. One of the features is an extensive array of respiratory protective equipment, including the permissible M.S.A. combination hose mask and M.S.A. tank gaugers' mask, which have been officially approved by the United States Bureau of Mines. The former is widely used by the oil industry, especially by men who must enter or work in oil vats or tank cars where oxygen deficiency or high concentration of gas may exist. In addition to many other forms of masks, the company shows approved oxygen breathing apparatus, Edison electric safety cap lamp, gas detectors and recorders, H-H inhalator for resuscitation, miscellaneous protective safety clothing and various first-aid materials, such as first-aid kits, hot pads, surgical dressings, etc.; also the new M.S.A. protective hats and caps for preventing head injuries.

McEVERLAST, INC.
36, 37 Oklahoma Building

The exhibit of McEverlast, Inc., Los Angeles, Calif., manufacturer of protective coatings for underground pipe lines, is displaying its new educational films, "Defeating Corrosion." The pictures feature the McEverlast mechanical methods of applying protective coatings.

In addition the exhibit includes illuminated wall pictures of McEverlast pipe-coating machines, samples of coated pipe, including samples of "Somastic" the new asphalt mastic coating manufactured by McEverlast, Inc.

Representatives of the companies in attendance are Edmund Shank, Los Angeles; S. S. Gibney and W. L. Lewis, Dallas, Tex., H. B. Mayes, Houston, Tex., and F. B. Benoist, St. Louis, Mo.

NATIONAL EQUIPMENT CORP.
Lot C, Open-Air Space

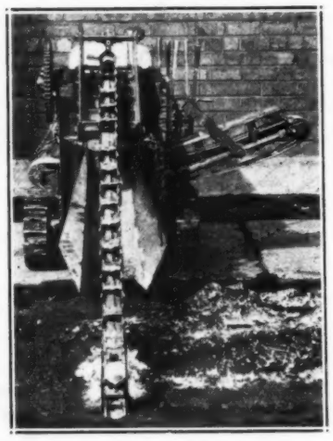
The National Equipment Corp., Milwaukee, Wis., through its divisions, is exhibiting a varied line of oil field equipment. The Leland Equipment Co., Tulsa, is distributor for the entire line.

C.H.&E. Division

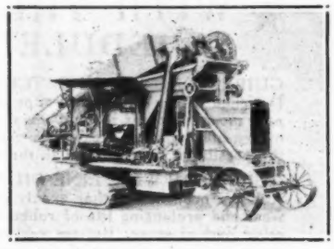
The C.H.&E. division is exhibiting the Little Gold Digger trench machine, a new outfit, light enough to go on a Ford truck, with a total weight of 3,300 pounds. It has a hydraulic lift and crowd on boom, safety clutch, new type of steering, and new type of self-cleaning buckets, mounted on multiplane. It saves back filling, tamping, replacing sod, and much labor. It cuts a trench 3½ inches to 6 inches wide and up to 48 inches deep. This little trencher is used for electric and gas connections, small mains, water connections, telephone cable and drain tile.

Parsons Division

The Parsons division is showing three Parsons ditchers, the "25," a full multiplane medium range trench model, with direct drive, inclosed transmission and patented offset boom; the "31," the largest full multiplane ditcher, with inclosed cut steel gears running in oil, roller



bearings and telescopic boom, and the "35," the newest and biggest of the Parsons pipe line ditchers, a machine that is said to dig economically in any kind of



soil conditions, from sandy loam or heavy gumbo to almost solid rock. An Insley full revolving convertible half yard shovel with new features and refinements completes the exhibit.

Insley Division

The Insley division is showing a Type R Insley crane.

The Koehring and Smith divisions are exhibiting concrete mixers.

NATIONAL LEAD CO.
56, 57 Oklahoma Building

Products of the National Lead Co., St. Louis, Mo., are shown by that company. They include litharge, red lead, white lead, basic lead sulphate, sheet lead, lead pipe, Babbitt metals, solder, ammunition, shotgun shells, die castings, pewter, sheet tin and engraved music plates. Many samples are for distribution.

NAYLOR PIPE CO.
20, 21 Oklahoma Building

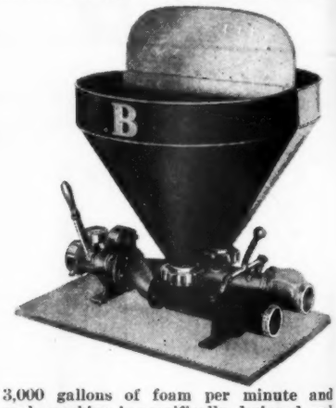
The Naylor Pipe Co., Chicago, is displaying Spiralweld pipe for air, water, oil and gas service. Structure, light weight, long life, economy and other features of this pipe are explained and demonstrated, but engineering data recently developed after exhaustive research and repeated tests are the main

features of the Naylor exhibit. These facts never before have been presented to oil men. The exhibit consists of samples of pipe, and motion pictures of various installations.

The Naylor Pipe Co. is represented by E. W. Hough, vice president and director of sales, and Messrs. Kirby, Field and L. S. Allen.

NATIONAL FOAM SYSTEM, INC.
17 Oklahoma Building

Four models of foam-producing machines are shown by the National Foam System, Inc., Philadelphia, Pa. These machines range in capacity from 300 to



3,000 gallons of foam per minute and each machine is specifically designed and built with regard to its capacity and purpose.

The National Foam System differs basically from all other dry powder foam equipment as it produces solutions at the machine rather than foam. To this cardinal principle alone is attributable the flexibility of the system and large volume of foam produced. The solutions discharged from the machines are conducted either through hose lines or pipe lines for as great a distance as required and when they are joined at the nozzle or in the mixing chamber on a tank perfect foam is produced.

The capacity of the largest or "Super" ejector is 3,000 gallons of foam per minute. It is said to be the largest portable dry powder foam unit available and three Super ejectors will produce in excess of 1,000 gallons of foam solutions per minute. This machine may be used either as portable equipment or may be permanently located and mechanical means provided for feeding chemical into the hopper. Frank G. Benedict, vice president and manager of the company's Tulsa office, is in charge of the exhibit.

NATIONAL CARBIDE SALES CORP.
31 Oklahoma Building

The National Carbide Sales Corp., New York, is exhibiting National Carbide, which is used extensively in the oil fields in the oxyacetylene process of welding.

FLOATING ROOFS

The problem of tank storage presents the old-time challenge of reducing the disastrous fire and evaporation losses in ordinary, so-called "gas-tight" storage. Profits flee with the escape of the lighter and more valuable fractions in rising vapors.

COLUMBIAN FLOATING ROOFS, by actual test and years of continuous service, have proved to reduce these hazards to a minimum.—By separating the liquid contents from the air and by virtue of their flexible construction, they permit volumetric and thermal changes without allowing any air to come into contact with the vapor, thereby retaining all volatile hydrocarbons.

IBIAN

Tests have shown that a working tank, equipped with an ordinary gas-tight roof and handling 10,000 bbls. of crude oil per day, will lose approximately 2,500 to 3,000 barrels a year.

Avail yourself of K. M. CO. unexcelled engineering service and get the facts on actual savings through use of COLUMBIAN FLOATING ROOFS.

THE KIRK-MORROW IRON WORKS COMPANY
IOLA, KANSAS

Licensed Manufacturers of Columbian Floating Roofs

cutting and general repairs. A new feature of the company's exhibit is the showing of National Carbide V.G. Light, National Carbide V.G. Handy-light and National Carbide Lantern. These carbide lights have been adopted by the company for the promotion of the use of carbide after careful investigation and research. The lights are already in use on railroads, among contractors, city departments, mines, etc., throughout the country, as well as in the subways of New York.

The exhibit is in charge of E. C. Ackerman, western sales manager, and assistants.

NORMA-HOFFMANN BEARINGS CORP.
38 California Building

The Norma-Hoffmann Bearings Corp., Stamford, Conn., is displaying a complete line of sample ball, roller and thrust bearings such as it is supplying for many kinds of equipment in the petroleum industry. The method of mounting the bearings is shown. The following representatives of the company are in charge of the exhibit: H. J. Ritter, A. A. Van Pelt, D. W. Robinson and D. E. Batesole.

NATIONAL TANK CO.
51 Texas Building and Lot B, Open-air Space

The National Tank Co., Tulsa, exhibits various sizes of National oil and gas separators, including the new Type C National separators. Separator equipment and controls are displayed with several new features in liquid level control. The National automatic air-gas lift intermitter is on display with some new features in intermittent remote control. New tank equipment is shown along with regular National tank equipment.

THE NATIONAL SUPPLY COMPANIES
88, 89, 122, 123 Texas Building

The National Supply Companies, Toledo, Ohio, is exhibiting no equipment, since manufacturing concerns with which it is affiliated are handling their own displays. The National, however, is keeping open house in its exhibition space, affording a convenient meeting place for visitors to the oil show.

THE OIL WELL IMPROVEMENTS CO.
51, 52 Oklahoma Building

The Oil Well Improvements Co., Tulsa, is showing its new packing head, which controls the flow through outer strings and supplements the control casinghead which controls the fluid in the inner string of casing.

The O.W.I. packing head provides outlets for taking gas from between strings and provides means whereby gas or water may be mudded off. Each bowl or body section has packing joint to fit any larger section. A single standard bowl or body section will pack off between the smallest size casing and any larger size in the series.

The unit provides quick assembly by slip joints, with all packing entirely encased in metal. Eight 1½-inch assembly bolts tie the entire hookup together between bottom or base flange and top flange.

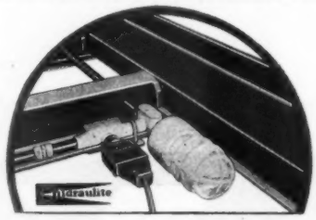
The unit is of all-steel construction with forged steel couplings and split rings. Each bowl or body section may be used interchangeably as a packing head against the collar or bradenhead against the pipe. The short overall height and small uniform diameter makes a strong, compact, efficient and convenient unit.

The new All Purpose control head unit for lubricating tools under pressure is shown also. This unit embodies the features of all previous types of control heads and oil savers. With interchangeable tops and companion casing flanges, the head may be converted into set screw, latch assembly, or lubricating type and handle any casing size or thread from 9 inches outside diameter down to 4 inches with the same control head body and without changing oil savers.

In charge of the exhibit are Alf G. Heggem, president; J. Burr Gibbons, vice president, and Ed Ligon and Robert M. Lee, representatives.

OILDRAULIC LIFT CO.
48, 49, 50 Refiners and Marketers Building

An electrically lighted automobile lift, originated by the Oildraulic Lift Co., Memphis, Tenn., is one of the outstanding features in the exhibit of that company. The makers assert that this unit will increase the service to the motorist on the part of the oil and petroleum marketer by extending the utility of the lift to both day and night service, if desired. It is stated that a large volume of greasing and oil business can be built up with truck operators, fleet owners, etc., and that the long winter evenings can be made profitable.



The unit, called the "Oildraulite," is patented and made exclusively by the Oildraulic Lift Co., which is exhibiting also a complete line of oil and greasing dispensing equipment in addition to electrically operated automobile lifts.

OKLAHOMA NATURAL GAS CORP.
71 Oklahoma Building

The Oklahoma Natural Gas Corp., Tulsa, has on display several new gas units that are practically new to the gas industry. One of these is a Humphrey gas unit heater, a heating plant and distributor combined. It embodies, in addition to the usual advantages of such equipment some entirely new and unusual features. It is made for both manufactured and natural gas and can be installed anywhere. It is foolproof in construction, compact in size and operates at high efficiency. It delivers 1,800 cubic feet of heated air per minute, and is especially designed to heat factories, stores, warehouses, garages, dance halls, auditoriums, churches, etc. It can be suspended from the ceiling if desired so that all the floor space available can be utilized.

The company also exhibits the Electrolux gas refrigerator, which has no moving parts. A tiny gas flame replaces all machinery, automatically adjusting itself. These features give it silence.

A circulating heater for the heating of small homes or as an auxiliary to the basement heating plant, is shown. This heater is recommended for the elimination of water vapor or "sweating conditions."

The booth is in charge of E. L. Dunnegan and T. D. Simpson.

OKLAHOMA STEEL CASTINGS CO.
47, 48 Texas Building

The Oklahoma Steel Castings Co., Tulsa, is exhibiting a representative line of refined electric steel castings and alloy steel castings, such as are used by the oil industry and allied manufacturing interests.

Included in the exhibit are electric steel castings for rotaries, draw works, fishing tools, elevators, spiders, pumping equipment, derricks, rotary bits and reamers, gears, pinions and sprockets; also high-pressure castings such as valves and fittings.

A complete line of alloy steel castings is shown to illustrate the latest developments in this important branch, which has become of so much interest to the engineers in the oil industry.

S. J. Moore, sales manager, is in charge of the exhibit, and E. H. Cornelius, president; B. Fleeger, vice president; L. C. Baston, secretary; Anton Johnson, works manager, and E. M. Newland, sales manager, are in attendance.

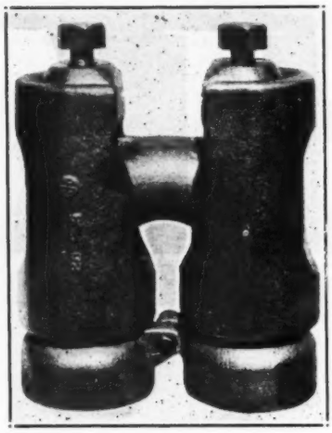
OIL CONSERVATION ENGINEERING CO.
82, 129 Oklahoma Building

The Oil Conservation Engineering Co., Cleveland, Ohio, is exhibiting the following Oceco equipment: Conservation vent valves, flame arrestors, nonsparking gauge and thief hatches and manhole covers, automatic tank gauges, two bolt pipe couplings, cylindrical lookboxes, still safety valves and bell caps and bubble plates for fractionating towers.

The exhibit is in charge of W. H. McGunagle, Tulsa manager, and H. H. Fleming, vice president and general manager.

THE OHIO STEEL FOUNDRY CO.
9 Refiners and Marketers Building

Among the various types of return bends displayed by the Ohio Steel Foundry Co., Springfield, Ohio, is an assembled type of bend recently developed. This return bend, besides providing full stream-line flow, incorporates in the design a true line contact joint obtained by the use of a ball on the tube end pieces, making contact with a tapered surface on the U part of the fitting. This is said to give a leaf-proof joint and eliminate difficulty in dismantling for tube cleaning.



The return bend is simple in design, consisting of yokes or housings, tube end pieces, set screws, set locks and U bends.

In installing the fittings tubes are rolled into the tube end pieces, these pieces being connected by a bolt through the slotted hole in the lug. Then the housings are slipped over the tube end pieces an eighth of a turn out of position and turned into place. This is followed by the insertion of the U bend then putting the set lock with screw in place and tightening the set screw, which completes the assembly. The connection of the tube end pieces by the use of a bolt through the slotted holes provides sufficient flexibility to compensate for the difference in expansion between the tube end pieces and the U bend.

THE OIL COUNTRY SPECIALTIES MANUFACTURING CO.
8, 9 Oklahoma Building

The Oil Country Specialties Manufacturing Co., Coffeyville, Kans., is exhibiting various types of chain drives used on its equipment. Most of the company's space serves as a comfortable meeting place for men in the production departments who are interested in the company's equipment. The O.C.S. airplane is stationed in Tulsa to take production men to see O.C.S. equipment actually in operation. The exhibit is in charge of J. W. McKewon, sales manager, with headquarters in the Philtower Building, Tulsa.

OAKITE PRODUCTS, INC.
61, 62 Texas Building

A section of the exhibit of Oakite Products, Inc., New York, features improved and economical methods and cleaning materials for salvaging out-of-service equipment. Used equipment is to be collected daily from various local producing companies and cleaned in a regular size supply yard tank.

Among the interesting equipment and method developments exhibited in the Oakite booth is a drum-type cleaning tank, for small parts cleaning, which can be reproduced by any producing company with available material at an exceptionally low cost.

H. L. Gray, B. C. Browning, D. O. Crawford, and W. B. Mix, are in attendance to give visitors information about Oakite technical service and cleaning materials. Literature describing daily and special cleaning operations in the petroleum industry is distributed.

WALTER O'BANNON CO.
104 Texas Building

New products featured in the display of the Walter O'Bannon Co., Tulsa, are O'Bannon composition valve cups and O'Bannon Cro-Lay tubes. In the O'Bannon valve cup the materials which form the composition are put through a process which insures a uniform, tough wall, flexible enough to expand evenly. When the processing of an O'Bannon cup is completed the structure becomes a homogeneous mass. This insures a long wearing life and constantly uniform bearing against the barrel wall.

In the O'Bannon Cro-Lay tube a layer of chromium is applied evenly to the inside polished surface of an O'Bannon tube. The surface is much harder than any oil sand. It is smoother than polished steel and it will not rust.

Other products shown are: Working barrel pumps and parts, O'Bannon liner barrels, valve cups, balls and seats and Cro-Lay barrels; safety sucker rod tools, O'Bannon frontlock hook, sucker rod elevators, polished rod clamps, S link, bell nipples and sucker rod sockets; safety tubing tools, O'Bannon tubing hooks, Moody automatic tubing spiders; Viking rotary pumps.

Walter O'Bannon, president and general manager; Paul H. Wendel, sales manager; and Charles H. Bloom, chief engineer, are in charge of the booth.

OKLAHOMA IRON WORKS
31, 32 California Building

The Oklahoma Iron Works, Tulsa, is showing its complete line of forged-steel fittings, also forged steel flange unions with metal gaskets in both the two-piece and four-piece types. Combination casingheads, bradenheads, casing rings and wedges and various types of forgings and castings also are shown. The exhibit is in charge of William Wright, R. W. Neal, George Clark and W. D. Taylor.

THE OSTER MANUFACTURING CO.
1, 2, 3 Arcade

The recent merger of the Oster Manufacturing Co., Cleveland, Ohio, and the Williams Tool Corp., Erie, Pa., has made possible a remarkably complete line of hand and power-operated pipe and bolt-threading machines and tools. Among other appliances of special interest is the Williams Rapiduction pipe machine, embodying several important improvements.

In charge of the Oster-Williams exhibit are A. S. Gould and Harry Liehr, sales engineers; H. C. Gardner and J. W. Wells, sales representatives, and E. C. Brown, operator.

JOHN POWELL & CO., INC.
22 Refiners and Marketers Building

The exhibit of John Powell & Co., New York, specialists in pyrethrum, or insect powder, consists chiefly of various forms of pyrethrum and of samples of the company's finished product made from its pyrethrum and kerosene.

Pyrethrum, more commonly called insect powder, is in its primitive form, a flower grown mostly in Japan and Dalmatia. The flowers are ground into powder and this powder, when treated with kerosene oil by a percolation process, makes an effective household in-

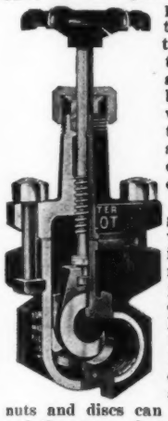
secticide. A pyrethrum insecticide is said to be the only type of product that is efficient in killing a general group of insets and, at the same time, is nonpoisonous to human beings and animals.

As specialists in pyrethrum products, the Powell company has been instrumental in bringing to the attention of large oil companies the market possibilities of liquid insecticides which obviously gives them a new field for their kerosene type oils.

The booth is in charge of Dr. Alfred Weed, entomologist, and Robert C. Kelly.

THE WILLIAM POWELL CO.
Lot C, Open Air Space

The William Powell Co., Cincinnati, Ohio, has a comprehensive display of its products for use in the oil industry, featuring the new "Master pilot" gate valve, a rugged iron body, bronze trimmed valve, which is said to give equally good service whether used on steam, air, water or gas lines.



"Master Pilot" gate valves are made with high grade cast iron bodies and bonnets. The stems, packing nuts, and discs are made from high grade steam bronze. For handling liquids and gases destructive to copper alloys the packing nuts and discs can be supplied of iron and the stems of steel.

The company is showing a full line of steel valves for pressures of 150 to 1,500 pounds. In addition to the standard line of bronze valves for low pressure service of 125 pounds the display includes hydraulic valves for pressures to 2,000 pounds. There is a complete line of standard and extra heavy iron body, bronze mounted gate, globe and angle valves.

Representatives of the company in charge of the exhibit are R. D. Allen, E. K. Pierce, James Coombe, E. R. Noll and William Heilig.

THE PRESCOTT CO.
Open-air Space

The Prescott Co., Menominee, Mich., is exhibiting a 7"x20" piston type, duplex, double-acting, power-driven slush pump, direct connected by means of a Fast coupling to a 225 horsepower Westinghouse steam turbine.

The normal speed of this pump is 45 revolutions, and any form of motive power such as electric motor, steam turbine, and Diesel or gasoline engine, with a speed of not more than 900 r.p.m. may be used, without any intermediate drive between the pump pinion shaft and the motive power. This reduction in speed is accomplished by means of two sets of gears in the power frame of the pump; the initial set being spiral bevel gears, and the intermediate set, single helical gears. The reduction from the driver to the pump is approximately 20 to 1.

The main shaft of this pump is mounted in SKF self-aligning roller bearings, while the intermediate pinion shaft, as well as the pinion shaft, are mounted in SKF roller and ball thrust bearings. The entire power end is automatically lubricated by means of splash and gravity lubrication.

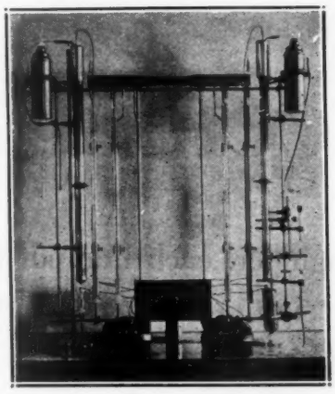
Features of this pump include the forged-steel crankshaft, forged-steel connecting rods, two-piece piston rods, special alloy steel liners, and the fact that the power end and fluid end are so designed that in moving the machine from one location to the other, the fluid body can easily be taken off of the power end.

THE PRAIRIE OIL & GAS CO.
100, 101, 110, 111 Texas Building

The Prairie Oil & Gas Co., Independence, Kans., and its allied organizations, the Prairie Pipe Line Co. and the Producers & Refiners Corp., are not making any exhibit, but are devoting their space to rest-room purposes for the convenience of visitors.

WALTER J. PODBIELNIAK
11, 12 Scientific and Technical Building

The exhibits offered by Walter J. Podbielniak, Ph.D., research chemical engineer, with analytical and research laboratories in Tulsa, include the Podbielniak improved fractional distillation analysis apparatus, along with charts, tables and wall displays explanatory of the services afforded by the Podbielniak laboratories.



These services include the commercial fractional distillation analysis of gaseous and volatile liquid mixtures, such as natural gas and gasoline, refinery gases and gasoline, motor fuels and absorption oils into the individual components boiling up to 100° C.; also higher boiling mixtures such as motor fuels, commercial solvents, petroleum and its fractions, into their individual components or into very close-cut fractions, boiling up to 400° F. and higher.

They embrace also research investigation of the composition of complex gaseous and liquid mixtures of all kinds; glassblowing and construction of special scientific glass apparatus; consulting and research service, testing of gasoline plant and equipment performance by means of plant material balances; and application of new analytical methods and fundamental theory of complex mixtures to research investigations.

The Podbielniak improved fractional distillation analysis apparatus for the accurate analysis of gaseous and volatile liquid mixtures into their component hydrocarbons has been redesigned in the direction of greater efficiency and greater ease of operation. For the first time, the precision model fractionating column is exhibited. This column is of a new design, possessing high fractionating efficiency, has no liquid reflux cooling bath and is resistant to thermal and mechanical shock. There also are exhibited precision model barometric type manometers, which are remarkably sensitive to change in pressure.

Several different types of the analysis apparatus are displayed and one is shown in actual operation. A novel feature of it is a mechanical "robot" which effects semiautomatic operation and rings for the human operator when it finds itself inadequate for some special adjustment or step in operation.

PITTSBURGH SCREW AND BOLT CORP.
(Colona Division)
1, 2 Texas Building

Thread protectors, sucker rod protectors, tool joint protectors and protectors for victaulic pipe are shown by the Pittsburgh Screw and Bolt Corp., Pittsburgh, Pa. In charge of the exhibit are John P. Hoelzel, Harry W. Schuetz, R. W. Dierker and George Cornelius.

PYRENE MANUFACTURING CO.
134 Oklahoma Building

The entire line of Pyrene fire extinguishers and tire chains, both passenger car and oil-field special truck chains, are shown by the Pyrene Manufacturing Co., Newark, N. J. In addition to the 2½-gallon Phomene foam type and Guardene soda and acid extinguishers, there are displayed the 10 and 40-gallon portable Phomene extinguishers on wheels and Phomene accumulators for fixed fire hazards. An interesting feature is the showing of the cut-out sections of the 1-quart and 1½-quart Pyrene fire extinguisher. This reveals how this fire-fighting device works. The new Pyrene bracket for mounting the 1-pint extinguisher on an automobile steering post is shown.

J. J. Doherty, Kansas City district manager, is in charge, assisted by B. S. Allen, J. C. Bolding and S. C. Moore.

THE PERMUTIT CO.
15 Texas Building

The Permutit Co. of New York, manufacturer of water treating equipment, and power plant accessories, is exhibiting a model of typical installation of Permutit water softener and filter, and an actual small size water softener of a brand new model having a saturator attached. Two kinds of Ranarex machines are operated, a CO_2 indicator and recorder and a gas density machine. This latter machine is particularly interesting as it measures mechanically the specific gravity of gases passing through it.

The exhibit is in charge of E. D. Dando, J. R. Crocker, P. V. Barmann and J. C. Tracey.

VICTOR L. PHILLIPS CO.
Lot D, Open-Air Space

The Victor L. Phillips Co., Tulsa, exhibiting on Lot D. on an open-air space, is displaying Littleford "hot dope," pipe liners, kettles, Rex triplex pumps, Rex centrifugal pumps, Rex diaphram pumps, Rex concrete mixers, Carbic lights, Beebe winches, Sterling wheel barrels, Hercules Fordson replacement engines, Ingersoll-Rand portable compressors, Ingersoll-Rand air tools and contractors' tools and supplies.

In attendance are Victor L. Phillips, president; T. L. Matchett, vice president; W. R. McGavren, sales manager; W. R. Wilson, Oklahoma manager; J. C. Schwenck, Tulsa branch manager; A. J. Hunter, sales manager; R. C. Hardcastle, sales engineer; H. R. Downs, advertising manager; J. W. Stang, manager Chain Belt pump division; L. W. Glaser, sales manager Littleford Brothers Co.; H. H. Buchanan, territorial manager, Bucyrus-Erie Co.

PERFECTION MFG. CO.
64 Refiners and Marketers Building

The Perfection Manufacturing Co., of Minneapolis, Minn., is exhibiting one of its bulk station pumps, a triple pump outfit with motor drive. The increasing use of Ethyl Gasoline has created a demand for triple and quadruple pump outfits where three or four pumps are mounted on the same cast-iron base with a single motor and with individual clutch for each pump so that any one of the pumps can be operated independently of the others.

The Perfection pump is a rotary gear pump and the outstanding feature in its construction is the helical gears. This makes a smooth running pump as the helical gears eliminate much vibration and noise.

PATTERSON-BALLAGH CORP.
6, 7, 8, 9 California Building

An exhibit of much interest to oil well drillers and operators is shown by the Patterson-Ballagh Corp., Los Angeles, Calif. It includes several models demonstrating the uses and properties of Bettis protectors and stabilizers. Samples of these are on display, as well as the tools employed to install them.

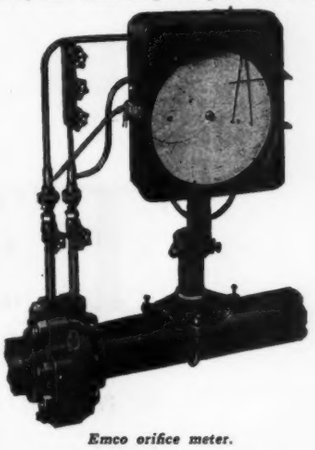
Samples of the latest Bettis oversize protector are of particular interest to drillers who are confronted with the problems involved in very deep drilling.

PENNSYLVANIA CAR CO.
19 California Building

The Pennsylvania Car Co., whose main offices are in Chicago and which has a large shop for erecting and repairing tank cars in Kansas City, Mo., is offering no exhibit, but is joining with the Petroleum Iron Works Co. and the Pennsylvania Tank Line in extending a welcome to visitors in the booth occupied by the three companies. J. M. Hughen, president of the company, represents it.

PITTSBURGH EQUITABLE METER CO.
37, 38 Scientific and Technical Building

The following products are exhibited by the Pittsburgh Equitable Meter Co., Pittsburgh, Pa.: Emco orifice meter, 20-inch, 50-inch, and 100-inch ranges with various static pressures, showing interchangeability of all these ranges, welded manifold piping, stainless steel working parts, and other major improvements in



Emco orifice meter.

the orifice meter design for the proper measurement under all operating conditions; water meters for municipal and

Emcorector.

oil field work; oil meters as used in production and refining processes; gasoline meters for service station work; Emco and Ironclad domestic gas meters; Emco No. 4 gas meters, showing internal working parts and equipped with combined record gauge; Emcorector, a new development for the proper registration of high pressures, as measured through a positive gas meter; Emco high-pressure and low-pressure balanced valve regulators, extensively used in the oil and gas fields; Emco Type B service regulators for miscellaneous low volume pressure reductions; new type high-pressure field regulator, weighted type, for miscellaneous oil field work and particularly pumping engines and fuel service; Emco water heater type regulator; Crawford sensitive regulator; water and gas regulators for gas refrigeration service; latest development of Emco regulators, specially designed for the efficient service in handling liquefied gas pressure reductions.

The Emco orifice meters, simple, rugged construction makes cleaning and servicing easy. The case is entirely watertight and moistureproof. It is convertible between 20-inch, 50-inch and 100-inch ranges. The only change necessary is in the mercury chamber. One of the most important features is the dial differential calibrating and adjusting device, that makes hairline adjustment easy. Micrometer adjustment is used for calibrating static element and zeroing pen. All parts of the differential movement that are

Engineering Ad

TO the skilled hands of the engineer, each line put onto drafting paper, each new design created, is an exciting engineering adventure. Such adventure is the very life-blood of industrial progress. To say—*"This machine or the parts of this machine cannot be redesigned or improved because change involves the scrapping of expensive dies and similar capital investment"* literally knots a rope about these hands that the industrial manufacturer needs most in this day and age of engineering adventure and rapid progress.

Untying Hands With Sivyer Parts

In this era of constant change, of new models and new lines, of specialized design and intense competition, Sivyer *Cast Steel Parts* untie the hands of designer, manufacturer and sales force.

For *Cast Steel Parts* give these things to light, small, complicated and thin section parts as well as heavier, simpler units:

(1) A simple, inexpensive pattern is the only investment required. A part, an assembly and even an entire machine can be changed more rapidly, more frequently and more inexpensively—to meet ever-changing field demands.

(2) The cost of adding and producing new lines, especially small production lines, is lowered. There is no high investment in dies or other producing equipment to charge off against a few units.

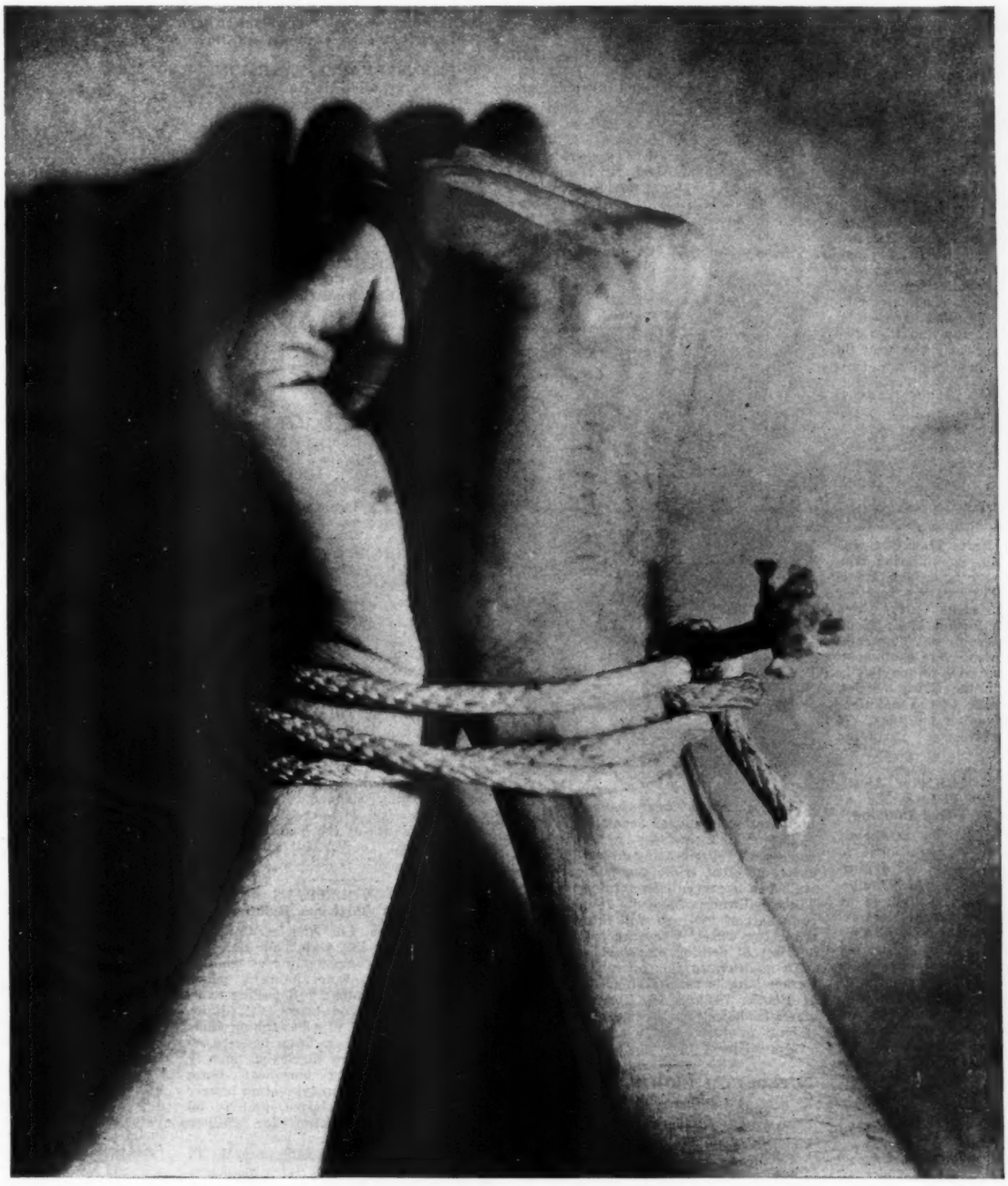
(3) The "bugs" that are constantly being brought to light by changing or unforeseen field conditions can be "licked" fast, before they damage reputation and sales.

(4) A wide range of alloys and heat treatments provides a flexibility of design to meet particular and hard field or manufacturing problems—and these alloys and heat treatments can be used on short productions without involving an excessive premium.

The place that Cast Steel Parts have gained in equipment and machinery manufacture is ably told by the story of what Cast Steel Parts are and do. That story you will find in the latest addition to the Sivyer Library: *Dependability in Steel Castings.* A copy may be had for the asking.

SIVYER STEEL CASTING COMPANY . . CHICAGO . . MILWAUKEE

venture is Forbidden



subject to corrosion are of stainless steel. The all-welded manifold overcomes small leaks.

The most important features of the Emcorector are that it automatically calculates to the proper base pressure, eliminates chart calculations and is adaptable to any make iron-case meter.

PEERLESS SUPPLY CO., INC.
119 Texas Building

The Peerless Supply Co., Tulsa, is showing for the first time the McKissick ball-bearing, universal joint, tubing swivel hook for use with McKissick safety blocks, and in addition its usual line, consisting of Peerless all-steel load binders, Peerless speed jacks, McKissick tubing bleeder and standing valve, Peerless floating type stuffing boxes and Peerless bronze sucker rod guides.

The Peerless exhibit is combined with that of the Smith Welding Equipment Corp. of Minneapolis, Minn., featuring Smith welding and cutting equipment, distributed in this territory by the Peerless Supply Co.

The following are in charge of the booth: W. H. McKissick, C. F. King, W. D. McKinley and O. M. Smith.

PITTSBURGH STEEL PRODUCTS CO.
69 Texas Building

A feature of the exhibit of Pittsburgh Steel Products Co., Pittsburgh, Pa., is a continuous motion picture film giving some of the highlights in the processes of making Pittsburgh Seamless casing, drill pipe and oil well tubing. The exhibit includes also groups of milled out sections of standard A.P.I. casing and high tensile casing showing clearly the way the different sizes nest in a well and their clearance.

In attendance at the exhibit are C. V. Lally, general manager of sales; Elmer T. Wible, advertising manager, and A. S. Vandervoort, Jr., S. E. Elder and Morvin Thomas of the company's Houston, Tulsa and St. Louis offices, respectively.

PROGRESSIVE BRASS MFG. CO.
10 Texas Building

The Progressive Brass Manufacturing Co., Kansas City, Mo., is exhibiting samples of its brass, bronze, aluminum, Monel metal and special alloy castings, together with finished replacement parts which the company makes for all kinds of oil field gas and steam engines. This company does not make complete equipment, but supplies raw material to practically all manufacturers in the Tulsa district, and to a large number of the manufacturers in the surrounding territory. It has been making replacement parts for years.

THE PURCHASING AGENTS' ASSOCIATION OF TULSA
15 Scientific and Technical Building

The exhibit of The Purchasing Agents' Association of Tulsa is educational in nature. Literature is distributed featuring the various activities in which the organization engages, both locally and as an affiliated chapter of the National Association of Purchasing Agents. This literature recommends study of buying along sound and equitable methods: study of materials and sources of supply; office procedure and the furtherance of a code of ethics for buyers. Standardization and simplified practice, as approved by the division of Simplified Practice of the Department of Commerce, is also featured in the distribution of certain forms, such as the simplified invoice, the standard purchase order form, etc.

PRESSED STEEL CAR CO.
11 Refiners and Marketers Building

The Pressed Steel Car Co., Chicago, has on the exhibition track a 10,000-gallon insulated tank car, typical of the kind of equipment this company is prepared to construct for those industries engaged in the production and refining of petroleum. The company also is equipped to furnish parts for and repair all kinds of tank car equipment.

The Pressed Steel Car Co. is represented by Frank L. Johnson, assistant general sales manager in the western district; C. H. Jackman and D. J. Whalen.

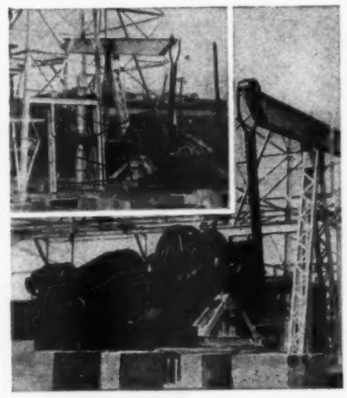
THE PETROLEUM IRON WORKS CO.
19 California Building

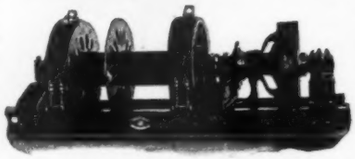
The Petroleum Iron Works Co., (Ohio) with general offices in Sharon, Pa., is not offering any exhibit, but in conjunction with the Pennsylvania Tank Line, Chicago, and the Pennsylvania Car Co., Chicago and Kansas City, Mo., has representatives present to greet friends. In attendance are A. O. Miller, president; J. A. Connelly, vice president in charge of sales; H. D. Skyrm and L. C. Meyers, sales representatives; A. M. Johnson, and H. J. Cullinan, vice presidents of the Petroleum Iron Works Co. of Texas; and J. M. Hughen, president of the Pennsylvania Tank Line and the Pennsylvania Car Co.

The Petroleum Iron Works Co. manufactures steel barrels and drums, fluid-fusion welded pressure vessels, tanks and tank cars.

THE PARKERSBURG RIG & REEL CO.
74, 75 Texas Building and Open-air Space

The Parkersburg Rig & Reel Co., Parkersburg, W. Va., has a complete rig, including a Parkersburg N. 4901-B, 122-foot A.P.I. steel derrick and Parkersburg's new chain-driven rig front and a Type 70 A. 7,000-foot double-brake sand reel. There is a set of steel wheels and steel equipment, including a 26-foot ICR type center rocker walking beam, steel A frame posts and HB pitman. A Parkersburg pumping counterbalance for attachment on standard crank is featured.





The exhibit includes a Parkersburg single-deck roller-bearing crown block and a set of 8-foot triple tug bullwheels installed in improved oil-retaining bearings. These bullwheels have an 18-inch diameter shaft of 1⅛-inch wall thickness and triple tug wheel. They are built for the heaviest of drilling or swabbing service.

In addition to this operating display, Parkersburg is maintaining headquarters at Booths 74 and 75, Texas Building, where it shows some of the smaller Parkersburg products, and where a welcome awaits oil men.

PETROLEUM ENGINEERING, INC.
4 California Building

An experimental absorber is the central feature of the display prepared by Petroleum Engineering, Inc. The absorber has three trays, each equipped with a different type of bubble cap. Each cap is an example of the cap used in actual service to meet different problems in fractionation or absorption. A light absorber oil and some form of gas is circulated through the absorber which has a glass wall, enabling visitors to study the action created in passage over the trays.

Working models of bubble trays are equipped with one of these three designs of bubble caps. The wall space surrounding the exhibit is a background for photographs of plants and equipment constructed this year.

Supervision of the exhibit is under Paul Raigorodsky assisted by Carl Wharton, P. C. Tucker and F. Van Acker.

PRESSED STEEL TANK CO.
51 Refiners and Marketers Building

The exhibit of the Pressed Steel Tank Co., manufacturer of seamless steel bilged barrels, steel drums, tanks, cylinders and seamless shells, consists of different types of cylinders for use in the interstate shipment of liquefied and compressed gases. Some of these are cross sectioned to show the distribution of metal as obtained by the seamless process. In addition to cylinders, the exhibit includes barrels and drums suitable for the shipment of special oils and greases.

Herman Merker, secretary and sales manager, is in charge of the booth, with J. A. Barr, western representative, and N. L. Nelson, sales engineer, assisting.

PENNSYLVANIA TANK LINE
19 California Building

The Pennsylvania Tank Line, Chicago, is occupying the booth jointly with the Petroleum Iron Works Co., of Sharon, Pa., and the Pennsylvania Car Co., of Chicago and Kansas City, Mo. J. M. Hughen, president of the company, is among the men receiving friends at the booth. The company, whose business is leasing tank cars, has no exhibit.

PALM BROTHERS DECALMANIA CO.
5 California Building

One of the largest manufacturers of decalmanias is Palm Brothers located at Chicago, Ill. The company exhibits advertising material as used by leading oil companies and manufacturing concerns.

THE PYLE-NATIONAL CO.
65, 66 Texas Building

The Pyle-National Co., Chicago, is showing floodlights for all purposes, service station lighting equipment, Turbogenerators for oil field service, electrical fittings and a gasoline electric plant for oil field service.

QUIGLEY CO., INC.
20 and 21 Refiners and Marketers Building

The exhibit of the Quigley Co., Inc., New York, includes Hytempite, Q Chrome, high-temperature cement, acid-proof cement, the Quigley gun for shooting refractory and concrete mixtures, Triple A protective coatings for metal, concrete, stucco, wood, etc.

New products shown are Q seal, a plastic, expansive joint-sealing compound for all industrial uses, which finds considerable application in oil and refinery fields, and Annite, a highly active colloidal cleaning compound for industrial use.

In attendance at the booth are W. H. Gaylord, Jr., L. V. Hill and Willard Parker.

J. P. RATIGAN
132, 133 Oklahoma Building

J. P. Ratigan, Los Angeles, Calif., in Booths 132 and 133, Oklahoma Building, is displaying a complete line of walking beam equipment, beam hangers, polish rod grips, and clamps; well pulling tools, including sucker rod hooks, "C" links, elevators, and bell nipples, tubing links and hooks. Three new beam hangers recently developed are displayed, namely No. 54 self-aligning horsehead beam hanger; No. 55 stirrup type beam hanger (for solid beams, not slatted) and No. 56 beam hanger combination for shallow wells.

In charge of the exhibit are J. P. Ratigan, L. C. Harbert, sales manager; E. S. Morrow, D. H. Swindler, C. J. Ratigan and J. J. Cave, factory representatives.

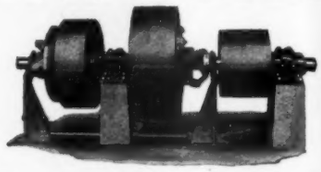
JAY B. RHODES CO.
50 California Building

The Jay B. Rhodes Co., Kalamazoo, Mich., exhibits its line of visible oil dispensers with the new finger tip groove which provides more convenient ways to give faster, safer service without slipping. Jay B. Rhodes is in attendance.

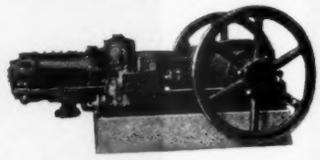
JOSEPH REID GAS ENGINE CO.
Open-air Space

The Joseph Reid Gas Engine Co., Oil City, Pa., is exhibiting its 14½"x18" engine, with one of its No. 55 heavy-duty reverse rigs, and the new Reid reversible countershaft.

The 14½"x18" engine augments the line of Reid Type C two-cycle engines. It is rated according to cylinder size and possesses the same inherent features as the smaller Type C engines, namely, high thermal efficiency, a wide speed range, exceptionally quiet operation at the high speeds and splash lubrication. It incorporates Timken main bearings, high-pressure lubrication to crank and cross-head pin, rotary type magneto, Eclipse lubricator for three-point cylinder lubrication, and a centrifugal water circulating pump mounted on the camshaft box and gear-driven by camshaft. The recommended power range between the speeds of 180 and 400 r.p.m. is from 80 to 135 b.h.p. with a fuel consumption of 13 to 11 cubic feet of 1,200 B.t.u. gas per brake-horsepower hour.



The new Reid reversible countershaft has been built for installations where a belted reverse countershaft is preferred to the direct-connected gear-driven reverse clutch. A stub shaft on the engine is supported by a pedestal bearing and carries two pulleys which transmit the forward and reverse motion to the 5-inch countershaft by means of a straight belt and a cross belt. The countershaft straight and cross-belt pulleys idle on the shaft until set in motion by two Reid 24-inch band type clutches which are keyed to the shaft. The countershaft take-off pulley is keyed solidly to the shaft. A single lever controls the mechanism and engages either the forward straight or the reverse cross-belt pulley, automatically disengaging the pulley which is being relieved of service. The cross-belt pulleys are overhung on the countershaft and stub shaft, which causes less bending movement and facilitates the removal of the reverse belt. A choice of Timken or bronze-bushed bearings is available throughout the rig.



THE REFINERY SUPPLY CO.
8, 9 Scientific and Technical Building

The exhibit of the Refinery Supply Co., Tulsa, consists of a display of instruments and specialties for the oil and gas industries, including oil thieves, vapor pressure bombs, Ac-Me specific gravity gas balance, Ac-Me recording gravitometer, tank car calculator, R.S. manometers, Trerice steam traps, Hay's CO_2 recorders and gas analyzers.

The Ac-Me gravitometer for recording the specific gravity of natural gas includes improved design in both the operating mechanism and outward appearance. The Ac-Me tank car calculator for figuring corrected tank car volumes has just been developed and is shown for the first time at the petroleum exposition.

REPUBLIC STEEL CORP.
23, 24, 25, 26, 27 California Building

The principal new feature of this year's exhibit of the Republic Steel Corp., Youngstown, Ohio, is the Republic electric weld pipe in large sizes and in very long lengths. In addition to this there is a display of applications of Agathon alloy steels in drill tools and in other applications as well as Toncan iron for corrosion resisting pipe, plates and rivets. Enduro KA2 stainless tube

Like the big Halliburton trucks, the Supervisors' cars are kept in perfect condition in Halliburton's shops—always ready to "get there somehow."

Containing information of interest to every oil man, THE CEMENTER will be sent to you free of all cost on receipt of the coupon.

To assure adherence to the quality standards of the Halliburton Oil Well Cementing Co., a corps of Supervisors is ready, at a moment's notice, to travel to any point in the oil fields.

The duty of these Supervisors (seasoned cementing engineers, all of them) is to see to it that cementing contracts are fulfilled with skill and care; to make available to oil men the cementing knowledge gained through years of practical experience; to analyze *special problems* and suggest practical solutions.

Because eternal vigilance is the price of leadership, Halliburton guards with jealous care the reputation it has established.

HALLIBURTON

OIL WELL CEMENTING CO.

Duncan, Oklahoma

Halliburton Oil Well Cementing Co.
Dept. OG, Duncan, Okla.

Without cost or obligation, please place my name on the list to receive THE CEMENTER regularly as issued.

Name _____

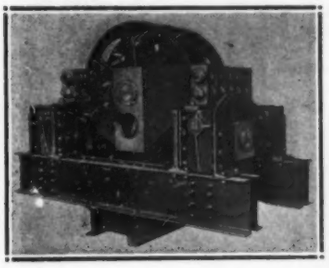
Company _____

Address _____

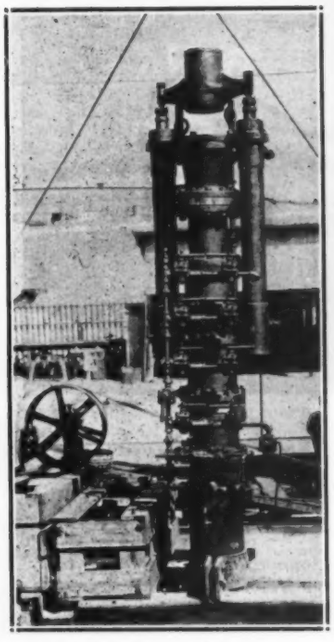
for high pressure cracking operations also is exhibited. These latter products were shown in previous years by Central Alloy Steel Corp., which has become a division of Republic Steel Corp.

REGAN SALES CO.
Lot E, Open-Air Space

The exhibit of the Regan Sales Co., Dallas, Tex., consists of a short section of a derrick upon which is mounted a combination, or California type, seven-sheave crownblock. Suspended from this



Regan crownblock



Regan tubing controller

in sequence are a 76-inch four-sheave traveling block and a special Regan alloy steel 9-inch casing hook.

The derrick, instead of being regulation height, extends only 40 feet above the ground, thus enabling the observer to view the entire string-up as though he were standing at a point midway between the fourble board and the water table, and to grasp the advantages of the non-spreading string-up possible with Regan blocks.

Grouped about this tower on the floor are various types of crown and traveling blocks. Perhaps the most interesting is the new nine-sheave combination type crownblock which is said to be the most massive device of its kind ever constructed, weighing 10,000 pounds. This machine, shown in the accompanying illustration, embodies the self-aligning feature in the cross sheaves, so that regardless of the distance of the traveling block from the crownblock, these sheaves align themselves perfectly.

The display also includes various types of well head casing and tubing hookups and some new and novel devices for running casing and tubing under pressure without the necessity of killing the well.

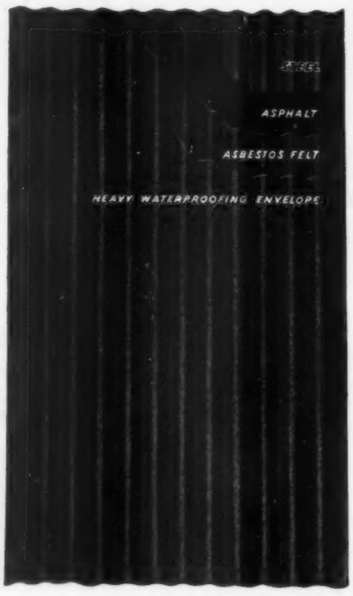
The Regan organization is represented by B. A. Cleveland, B. S. Minor, F. J. Swarm, Jim Begg, Joe Beer, D. A. Cant, W. S. Proctor, W. A. Pitts, R. V. Stout, R. A. Weaver, W. H. Stroud and Jim Lethroe.

THE RIDGE TOOL CO.
31, 32 Texas Building

The Ridge Tool Co., Elyria, Ohio, is exhibiting its pipe wrenches, pipe cutters, pipe vises and Super wrenches. It also is showing a stock and die which is a departure from others on the market.

H. H. ROBERTSON CO.
81 Oklahoma Building

The H. H. Robertson Co., Pittsburgh, Pa., is showing Robertson protected metal roofing and siding sheets. This material has been used by industrial concerns for 25 years. Robertson protected metal is a steel sheet (any desired gauge) on which external coatings of asphalt, asphalt-impregnated asbestos felt, and a heavy waterproof envelope are applied. These



coatings are bonded together under heat and pressure, making a sheet covered on both sides and edges. The material resists rust and corrosion, eliminates painting, and reduces maintenance.

Another product on exhibit is the Robertson ventilator, a stationary type roof ventilator with a large exhaust capacity. It operates on all types of roofs, is storm and rain proof.

Robertson skylight and side wall sash, also on exhibit, are of the puttyless type. The bars are formed from structural steel members, and the glass is cushioned on asphaltic strips. This construction eliminates deflection of the glass and, because of proper cushioning, breakage and leaks are prevented.

The entire line of Robertson products is designed to eliminate rust and corrosion, give long years of care-free service, and supply an industrial building material which reduces obsolescence.

H. RICKMAN
16 Arcade

H. Rickman, Tulsa, is exhibiting the S-R tubing protector, designed to stop wear on both rods and tubing. It is made of pecan and hickory. According to the manufacturer the device lightens the load, floats the rods 20 per cent, eliminates counterbalances, makes the engine work more freely and easily. The protector is oil and water proof, chemically treated against absorption.

REED ROLLER BIT CO.
13, 14 Texas Building

The Reed Roller Bit Co., Houston, Tex., is displaying its new Type 31 rock bit, as well as the Type 31 roller bearing rock bit; new Type 31 reamer, and all improvements on the wire line bit, the Barrett-Robishaw bit and the Reed-Elliott hard and soft formation core bit.

Lock McDaniel, general sales manager of the company, is in charge of the booth.

SPENCER TRAILER CO.
Lot C, Open-air Space

The Spencer Trailer Co., Augusta, Kans. exhibits a tandem axle pole trailer of 10-ton capacity. This tandem axle trailer is said to make possible the hauling of heavier loads with less strain on tires, springs and other parts and at the same time protect and comply with road law restrictions. The gears were designed primarily for use under van bodies

Spencer 10-ton tandem axle trailer.

and tank trailers, so when a demand for larger pole trailers presented itself early this year the Spencer company was prepared.

The Model TH 10-ton trailer in this exhibit is equipped with eight 40 by 8 heavy duty tires. The company also produces this type of trailer in two lighter sizes, 4-ton and 6-ton capacities. All three sizes have been in use several months.

In addition to this new type trailer, the company manufactures all sizes of two-wheel pole trailers, semitrailers and four-wheel trailers.

SMITH SEPARATOR CO.
90, 121 Texas Building

The Smith Separator Co., Tulsa, is exhibiting the new Smith oil and gas separator. Ever Ready protector (tubing catcher) and the Waters water gauge cock, in Booths 90 and 121, Texas Building.

The exhibit includes model of the new Smith separator, fully demonstrating the true centrifugal mist traps, the fourth and final stage in separation. The accompanying illustrations show the new

separator and a sectional view of the true centrifugal mist traps. The number of traps in each separator is based on the working pressure and capacities involved.

The following representatives are present at the booths: L. B. Rowsey, E. J. Riley, J. E. Walker, F. G. Love, M. Langford, J. F. McKelvey, S. V. Dillon, all of Tulsa; T. E. Ward, New York; R. F. Ley, New York; W. C. Jolly, Fort Worth, Tex.; J. M. Sides, Hobbs, N. Mex.; A. D. Johnston, Pampa, Tex.; J. F. Buford, Houston, Tex.; C. H. Williams, Oklahoma City; W. V. Fuller, Oklahoma City, and F. H. Smith, Casper, Wyo.

SERVICE STATION EQUIPMENT CO.
45 Refiners and Marketers Building

The Service Station Equipment Co., with southwestern division office in Dallas, Tex., is showing the latest typical models of Bennett gasoline pumps, metering, visible and piston types; ECO compressors, tire inflators, car washers; Bennett highboys, grease equipment, etc. Representatives in attendance are Stanley W. Foran, Southwestern division manager; Sam W. Smith, Tulsa branch office manager; Andrew W. Deacon, Middle States division manager (St. Louis), and George M. Roach, Kansas City branch office manager.

SAN ANGELO BOARD OF CITY DEVELOPMENT
47 Scientific and Technical Building

The exhibit of the San Angelo, Tex., Board of City Development has a large map of Texas on the back wall showing San Angelo's geographical location with reference to the large cities of the State, and her relative position to the various oil fields. The map is designed primarily to give the spectator an idea of Texas' petroleum resources. It is supplemented by attractive displays on each side of it.

Two maps, each 4½'x5', are in the booth also. One is an ownership map of the Edwards plateau region where much wildcatting is now taking place. The map shows the holdings of companies and independents, and also the location of the drilling wells. The other map is an ownership map of the West Texas Permian basin. The locations of the major fields in this area are clearly market and the Yates, Big Lake, Howard and Glasscock, Hendricks, Taylor-Link, Andrews County and all others are shown.

Miss Micaela Rogers, assistant manager of the San Angelo Board of City Development, has charge of the booth. Literature descriptive of the city and district and of particular interest to oil men is distributed at the booth.

STOCKHAM PIPE & FITTINGS CO.
106, 107 Texas Building

The Stockham Pipe & Fittings Co., Birmingham, Ala., features the Stockham return bend, primarily developed for use with tube cracking stills in oil refineries. This bend has been especially designed to

reduce the time the unit must be out of service for replacement or cleaning of the tubes, and to increase the safety factor.

In this assembly, the tube ends are upset at the fabricating shop, or at the mill, at the proper temperature to insure the best physical structure of the tube material. This permits the use of special alloy seated tubes. The U-piece is the only part of the assembly in contact with corrosive elements and it can be replaced readily. The return bend is manufactured to meet any specifications for pressure, temperature, tube diameter and tube spacing.

The Stockham display includes also the company's full line of cast-iron, malleable and electric steel fittings used extensively in the oil fields. Representing the company are D. W. Stockham, Walter G. Winburn, Neff S. Cass and J. Frank Ward, Jr.

SPANG & CO.
102, 103 Oklahoma Building

Spang & Co., Butler, Pa., exhibits the Spang weldless jars that are drop forged without welds, from a single piece of alloy steel, specially heat treated and tempered. In addition to this, the firm exhibits its regular line of drilling tools. S. J. Spang, Ferd Spang and John W. Brandon are in attendance.

SONNER BURNER CO.
120 Texas Building

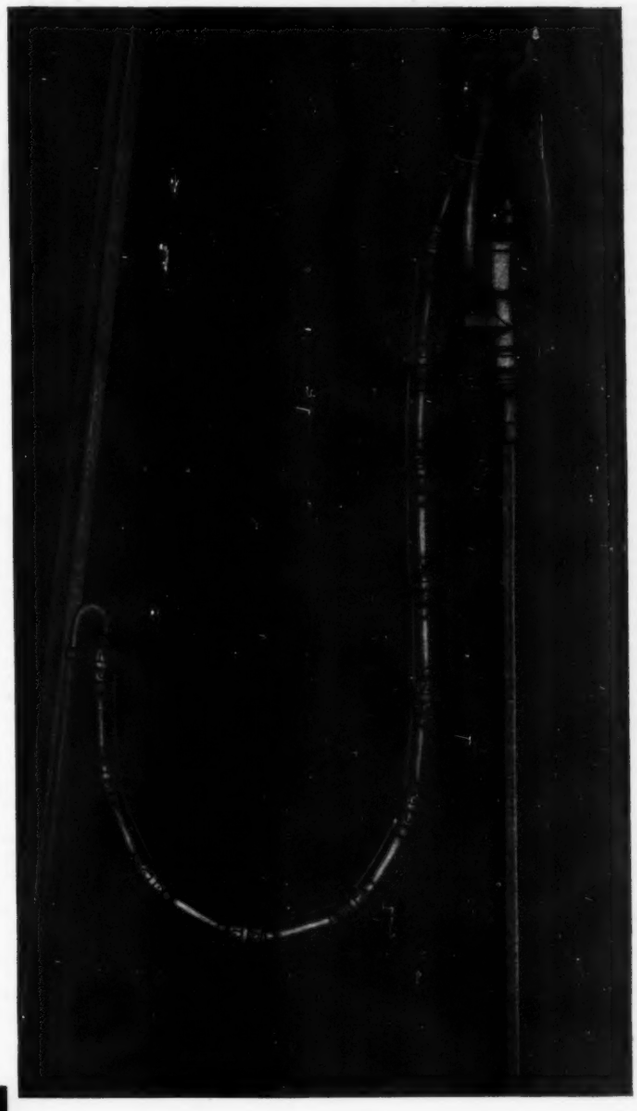
The Perfecto gas burner, manufactured by the Sonner Burner Co., Winfield, Kans., is shown by that company.

The burner consists of a section of 12 units bolted rigidly together, and of a size that can be handled by one man. It is mounted on adjustable hangers, furnished by the manufacturer. The hanger is hung on the mud rim of firebox boilers, or to the foundation of an HRT

MAXIMUM

FLUID PASSAGE

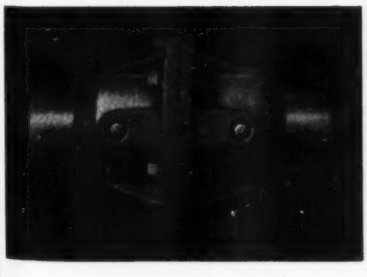
Not only does the Elliott Steel Rotary Hose offer greater fluid passage area, but the construction of the universal joints is such that the least possible resistance is afforded the cutting action of sand particles carried in the rotary mud. The extreme flexibility of the hose eliminates sharp bends or right angles with no distortion of fluid passage. Simple in construction throughout, the best grade of steel has been heat-treated and machined to form the complete assembly. Write for further information and illustrated folder.

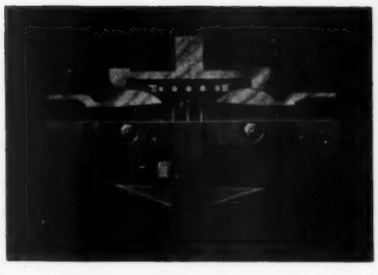


ELLIOTT

— STRAIGHT LINE —

ROTARY HOSE





The Elliott All-Steel Straight-Line Rotary Hose offers outstanding features:

1. Maximum fluid passage with no right angles or distortion of flow.
2. Elimination of back pressure on pump.
3. Full flexibility in 2"—2½"—3" and 4" sizes.
4. Universal joints tested in excess of 8000 lbs. per square inch.
5. All-steel construction, heat treated.
6. Eliminates loss of time occasioned by hose failures.
7. Simple in construction. Each joint is identical.
8. Length readily regulated.
9. Each joint is a complete union.
10. Utilizes a wire safety line.

ELLIOTT MANUFACTURING CO.

5423 McKinley Avenue — Los Angeles, CALIF.

boiler, supporting the burners so that they are on a level, or where coal grates would be if the boiler were being fired with coal.

The burner will fire a boiler to capacity on about 1 pound of gas, under usual field conditions, and by increasing the number of sections, each rated at 25 horsepower, at the above pressure, or by a slight increase in the pressure, the boiler can be fired at considerable overload.

The flame is uniformly distributed over the grate area, and it is short enough to preclude damage to the boiler. Even when carrying large overloads on the boiler, there is no tendency of the fire to roar nor of the boiler to vibrate. After the burner sections are set in place, all the rest of the grate area not occupied by the burner is closed off with fire brick, or by other means, thus preventing columns of excess cold air to flow in through the firebox and cause boiler leaks.

SPANG, CHALFANT & CO.
52, 53 Texas Building

The exhibit of Spang, Chalfant & Co., Inc., Union Bank Building, Pittsburgh, Pa., covers drill pipe and casing. To illustrate the method by which the company determines the fatigue resistance of steel used in drill pipe it is operating a small Tinius Olsen fatigue testing machine. A photograph of the machine at the mill which similarly tests full size drill pipe is shown. The main object is to point out the fatigue resistance of the company's heat treated drill pipe.

On casing, the exhibit shows several samples of regular casing and the new Simancro alloy casing, which have been jumped out of their couplings in the pulling machine to illustrate the much higher strength of the alloy casing. The following representatives of the company are in Tulsa for the duration of the exposition: T. L. Kirk, assistant manager of sales, and L. L. Minor, Jr., assistant general manager of sales, Pittsburgh, Pa.; J. D. Hardcastle, manager of sales, St. Louis, Mo.; F. Charles Shugart, field representative, Sweetwater, Tex.; F. Hoving, research engineer, Houston, Tex.; E. B. Perkins, field representative, and H. G. Texter, sales engineer, Tulsa.

THE SULLIVAN CO.
70 Texas Building

The Sullivan Co. of Oklahoma, in Booth No. 70, Texas Building, is showing the following:

Slush Mix, the triple action mud mixer of which the manufacturer says: "Of heavy specific gravity, it remains always in suspension. It carries the cuttings from bit to surface. It acts as a binder in any mud and is readily soluble in water. It picks up and walls up sand, shale, etc., and prevents caving. It comes in liquid, paste or powder."

"Hef-T," super heavy mud for high-pressure fields. It is said of this that it will control any gas pressure; walls up holes in any formation, increases weight 100 per cent.

Fissurseal for plugging fissures and cracks, which the manufacturer says ends the antiquated methods of using cut-up bull rope, cottonseed hulls, etc. Fissurseal congeals and expands and restores circulation, and is recommended for water shut-off and reconditioning walls.

Gelite, mud jelly rotary compound, has a jellying action and remains in suspension. It gives additional weight to the mud and lubricates, and seals up the walls of the hole, prevents caving, protects drilling equipment and speeds up drilling.

Kleenawell, which cleans tubing and rods, removes paraffin, asphaltum, gypsum or salt.

Konset, which, it is said, will waterproof, accelerate and bond any grade of cement.

SAFETY PULLING MACHINE CO.
Lot H, Open-air Space

Safety Pulling Machine Co., Independence, Kans., is showing its latest model pulling out machine. The exhibit is in charge of W. Thompson.

STAR DRILLING MACHINE CO.
Open Air Space

The Star Drilling Machine Co., Akron, Ohio, is showing for the first time its new No. 49 heavy duty spudder. The machine drills to 3,500 feet and combines portable machine economy in moving and rigging up with standard rig capacity.

Its bull reel has a capacity of 8,000 feet of 1-inch line. The machine will handle a 5½"x36' stem in big hole. The new Star No. 49 spudder is furnished in either the C (counter shaft) type or in the super tractor, self moving type.

One of the smaller Star spudders, the No. 43 is also on exhibition. This machine will drill to a depth of 1,500 feet and clean out to proportionally greater depths. It is built in three models to meet various moving and operating conditions.

Also on exhibition are Star drilling engines for portable and standard outfits. They have instantaneous reverse with single lever controls. They are powered by 4-cylinder 105 horsepower engines, which will operate on either gasoline or natural gas.

Carl Ahlers and J. H. Nelson are in charge of the Star booth.

SHARPSVILLE BOILER WORKS CO.
30 Refiners and Marketers Building

The Sharpsville Boiler Works Co., Sharpsville, Pa., is featuring its Sharmeter, a meter dispensing system for motor fuels, 500 series in both the single and tandem cabinets equipped with Underwriters' label. It also is displaying the Sharlite, a floodlight for service stations, refineries, bulk plants, swimming pools, football fields and other night activities.

THE SULLIVAN MACHINERY CO.
Open-air Space

The Sullivan Machinery Co., Chicago, in co-operation with its representative, George E. Failing, of Enid, Okla., has an exhibit in its building.

This exhibit consists of a Sullivan Type 50 diamond core drill, recently developed for shallow production work and unusually deep structure test drilling, and a Type 40 portable gasoline driven hydraulic feed machine.

Type 40 will take either 1⅛-inch or 2-inch core, and has a capacity of 1,000 feet in depth, with the larger size fittings. It is mounted on a portable truck and equipped with direct connected gasoline pump and hoist.

Type 50 is a gasoline engine driven outfit consisting of a hoisting drum, hydraulic swivel head with a pump for hydraulic, and engine, mounted on a substantial steel truck which is convenient for moving. The Type 50 drill will take either a 2-inch or a 3-inch core, and will handle 3½-inch flush joint drill pipe to a depth of 1,500 feet; PK rods to a depth of 2,200 feet, and "N" drill rods with 2-inch core fittings to a depth of 300 feet. The Type 50 drill will be in operation throughout the length of the show.

The circulation for the Type 50 drill is supplied by a heavy duty mud pump operated by a tractor through chain drive. The derrick, which will be of the Moore tubular steel pattern, is lighted from a "Sullite" gasoline engine driven generator by means of the Sullivan Stringalite lighting cable. Both Stringalite and Sullite will be shown for the first time at this exposition.

A Sullivan cathead, Class HW-1 is installed in the derrick for handling casing, pipe, etc., to the drill. It will be operated by compressed air furnished by a Sullivan 110-foot portable gasoline engine driven air compressor Class WK-312.

The company is represented at the show by Morris C. Allen, manager diamond core drill department, Chicago; D. M. Sutor, St. Louis, Mo., J. E. M. Schultz, Dallas, Texas, George E. Failing, Enid, Okla., and others.

SOUTHWESTERN BELL TELEPHONE CO.
17 Refiners and Marketers Building

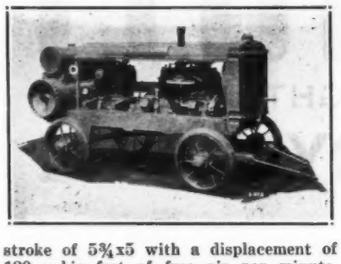
The Southwestern Bell Telephone Co. has an interesting display of telephone typewriters in Booth 17, Refiners and Marketers Building. These machines are operated in the same manner as the ordinary typewriter. Messages are transmitted instantly over wires to receiving machines which reproduce them accurately in typewritten form.

Oil companies desiring quick communication with distant branches and field headquarters have found the telephone typewriter particularly adaptable to their needs and in the past year the use of this service has increased in the oil industry.

In charge of the exhibit are Messrs. Riley, Berry, Dailey, and Steanson.

SCHRAMM, INC.
Lot C, Open-air Space

Two pieces of equipment are shown by Schramm, Inc., West Chester, Pa., the No. 120 portable engine-driven compressor and the portable engine-driven welder. The compressor has a bore and



stroke of 5¾x5 with a displacement of 120 cubic feet of free air per minute. Another distinctive feature is the fact that this compressor is equipped with a self-aligning heavy duty clutch that permits the operator to start his engine independently of the compressor.

The portable engine-driven welder can be operated by either a four or six-cylinder heavy duty tractor type of engine. The unit shown is of the six-cylinder type.

SIVYER STEEL CASTING CO.
6, 7, 8, 9 Texas Building

The Sivyer Steel Casting Co., Milwaukee and Chicago, is exhibiting with its two associate companies, the Federal Malleable Co. of West Allis, Wis., and the Chain Belt Co., of Milwaukee, Wis. The Sivyer Steel Casting Co., in addition to displaying rough and machined alloy steel castings, exhibits laboratory and metallurgical appliances in operation necessary to the production of high grade alloy steel castings.

Those present are L. S. Peregoy, president; M. A. Fladoes, vice president in charge of sales; D. Zuege, metallurgist; A. H. Oberndorfer, advertising manager, and Charles A. Fischer, district representative, Fort Worth, Tex.

SHELDON MACHINERY CORP.
Open-air Space

The Sheldon Machinery Corp., New York, is exhibiting a complete line of rotary drilling equipment, featuring the hydraulic feed mechanism, coring machines, deep well drilling units, and the flush joint pipe method of drilling against and controlling well pressures. The exhibit is an operating one and is rigged up under a Lee C. Moore latest type derrick in the outside space known as High Derrick Piers.

The units of the exhibit consist of the Type "H" rotary drilling machine, which has the principal units mounted on a substantial steel base. This arrangement facilitates transportation and the erection of the machine. The whole machine is transported, as a unit, or may be divided into smaller units, if transportation is difficult. This type of machine may be driven with any of the usual power, such as steam, electricity, gasoline, or Diesel engines. The engine is mounted on the same base with the rotary table and drawworks. When internal combustion power is used, the engines are mounted alongside the derrick and the reverse clutch is mounted on the derrick floor near the machine.

The company also is exhibiting its Type "D" machine, a light rotary rig with the principal units, including the engine, mounted on the same base. This machine is rated for production drilling to 2,500 feet, but has drilled several wells to over 4,000 feet, finishing the hole with a 6-inch bit. The usual power for this machine is a 75-horsepower Waukesha engine. In addition to being a light production machine, the Type "D" rotary is a coring machine for any depth to 4,000 feet or beyond.

A Sheldon-Burden Type "HR" hydraulic feed rotary table exhibited is designed to be driven in the usual manner from any of the present types of drawworks. This arrangement permits the operator to get the benefits of the hydraulic feed mechanism and still use his present equipment. This table accommodates the same 100-ton capacity hydraulic feed mechanism as is usually supplied with the Type "H" machine. When the hydraulic feed mechanism is not used, the table may be used as an ordinary rotary table.

Of particular interest to the operator is the new "Hydro-Kelly." It is really a hydraulic feed mechanism which is placed in any of the larger sizes of the usual makes of rotary tables. By the use of this mechanism the operator gets the advantages of hydraulic feed without changing any of his present equipment.

A complete line of equipment for drilling against high well pressures is shown, including flush joint pipe to the Sheldon-Burden type to flush joint tool joints, stuffing boxes, packing, back pressure valves, and other accessories necessary in this class of work.

SKELLY OIL CO.
46, 47, 58, 59 Refiners and Marketers Building

The Skelly Oil Co., Tulsa, occupies Booths 46, 47, 58 and 59 Refiners and Marketers Building with a mechanical demonstration of lubricating oils, and features all the company's trade-marked oil and gas products, including Skelgas. Glenn Condon is in charge of the booths, assisted by W. E. Jack and Harry Tietgen of the lubricating department, and A. H. Vigdon, Skelgas zone manager at Tulsa.

STERLING STEEL CASTING CO.
33 Texas Building

The Sterling Steel Casting Co., East St. Louis, Ill., is exhibiting machined and finished casting. The vistor can visualize the stages of the manufacture of steel castings from design and pattern equipment to the completed article, and can discern the various types, metal-sections and application of the individual casting and their specific adaptation to special equipment.

In addition to the special castings, the company has a display of cast steel cylinder heads for gasoline engines. The heads are shown both in the rough cast-

(Continued on Page 391)

ROCKY MOUNTAIN AREA

(Continued from Page 106)

first gas at 2,780 feet and is drilling at 2,968 feet in anhydrite.

The Prairie Oil & Gas Co.'s No. 1 Grimes, SW cor. NW, Section 28-18-38, topped the pay at 4,065 feet and is drilling at 4,075 feet in lime.

Shell's Operations

The Shell Petroleum Corp.'s No. 1-B McKinley, CNL SW, Section 20-18-38, cemented the 9⅝-inch at 2,810 feet, and its No. 2-B McKinley, SE cor. SW, Section 20-18-38, is drilling at 2,107 feet in salt. Last named topped the anhydrite at 1,565 feet and the salt at 1,705 feet. Same company's No. 1-B State, NW cor., Section 33-18-38, is drilling at 3,744 feet in anhydrite and lime. It had 25,000,000 feet of gas at 3,396 feet and an increase at 3,688-97 feet. Shell's No. 2 Grimes, NW cor. SW, Section 28-18-38, is drilling at 3,923 feet in lime and had a show of oil and gas at 3,195-3,200 feet. Same company's No. 3 McKinley, SE cor., Section 19-18-38, is still a location.

The Sun Oil Co.'s No. 2 McKinley, C SE NE, Section 5-19-38, cemented the 9⅝-inch at 2,750 feet, and its No. 3 McKinley, NW cor. NE, Section 5-19-38, is drilling at 1,656 feet in salt. It topped the anhydrite at 1,452 feet and the elevation is 3,626 feet.

The Texas Company's No. 3 McKinley, C SW SW, Section 4-19-38, is drilling at 2,720 feet in anhydrite. It topped the anhydrite at 1,480 feet and cut the salt at 1,700-2,643 feet. Same company's No. 2 McKinley, C NE SE, Section 5-19-38, cemented the 9⅝-inch at 2,950 feet. It bottomed the salt at 2,550 feet and had a show of gas at 2,816-13 feet.

The Texas Pacific Coal & Oil Co.'s No. 2-G State, NE cor. SE, Section 24-18-37, is bottomed at 4,208 feet in lime and fishing for 1,500 feet of tubing.

The Tidal Oil Co.'s No. 3 Grimes, NE cor. SE, Section 29-18-38, is drilling at 3,050 feet. It topped the brown lime at 2,785 feet and had the first gas at 2,800 feet.

Eunice Area—Lea County

The Tidal Oil Co.'s No. 1 Colman, SW cor. NE, Section 17-21-36, in the Eunice area, was deepened to 4,147 feet and had a hole full of sulphur water at 4,140-47 feet. It was plugged back to 4,015 feet and tested, and made only one bailer of water in 11 hours. It produced 375 bbls. of oil in 24 hours. This well proves up half a mile of territory northeast of the Continental Oil Co.'s No. 1 A. E. Meyers. George F. Getty, Inc.'s No. 1 State, NE cor., Section 19-21-36, an offset on the southwest to the Continental's well, is drilling at 3,879 feet in lime after setting the 7-inch at 3,824 feet. It had oil at 3,821-23 feet, 3,826-28 feet and 3,872-77 feet. The Ohio Oil Co.'s No. 1 State-McDonald, SW NW SW, Section 15-22-36, several miles to the southeast, showed an increase in sulphur water at a total depth of 3,900 feet and is plugging back. It was averaging 248 bbls. of fluid per day of which 12 per cent was water. The Continental Oil Co.'s No. 1 Meyers, SW cor. NW, Section 28-22-36, has finished up a bad fishing job that has been under way since last fall. It is drilling at 3,710 feet after shooting the tools with 10 quarts and then successfully sidetracking them. The old hole was bottomed at 3,750 feet where it was making 10,000,000 feet of gas per day when the trouble developed.

Cooper Area—Lea County

The Texas Pacific Coal & Oil Co.'s No. 1 State, SE cor. SW, Section 22-23-36, is bottomed at 4,570 feet in gray lime and has a hole full of sulphur water.

Caprock Area—Lea County

The Texas Production Co.'s No. 1 Bridges, SE cor. NW, Section 17-17-34, is drilling at 1,143 feet in red shale.

Jal Area—Lea County

The Midwest Refining Co.'s No. 19 Farnsworth, SW SW, Section 14-26-37, is drilling at 3,705 feet in hard lime.

Lovington Area—Lea County

Galt, Brown and others' No. 1 State, NW NW, Section 9-15-35, is drilling at 294 feet in red rock.

Eddy County

R. D. Compton's No. 3 Brainard, SW SE SE, Section 5-18-27, has a good producer to the northwest of the Artesia Field at 1,260 feet. It is flowing by heads and is estimated at 100 bbls. daily. Flynn, Welch & Yates' No. 2 Stevens, NW NE SW, Section 13-17-30, Maljamar area, made 60 bbls. initial production at a total depth of 3,442 feet. Leonard & Levers' No. 4 State, SE SW, Section 21-17-29, is drilling at 1,400 feet in red rock and anhydrite. Lockhart & Co.'s No. 2-X Parke, NW NW, Section 23-17-30, is bottomed at 3,346 feet in lime and preparing to swab. It has a hole full of oil from 3,275-80 and 3,335-46 feet.

De Baca County

The Matador Oil Co.'s No. 1 Wood, SW SW, Section 6-4n-20, is shut down at 3,001 feet to finance.

Otero County

R. H. Ernest and others' No. 1 Located Land Co., Section 20-25s-7e, 330 feet from east line and 330 feet from south line, cemented 15½-inch pipe to shut off water; drlg. at 752 feet.

Valencia County

The Acme Development Co.'s No. 1 Santa Fe Railroad, SW NW, Section 27-7s-4w, is bottomed at 4,690 feet and has recovered tools.

Sandoval County

The Mayflower Oil Co.'s No. 1, C NE SE, Section 23-20-2w, was plugged and abandoned at 1,835 feet.

COLORADO

Morgan County

The Indian Territory Illuminating Oil Co.'s No. 1 State, C NE NE, Section 16-1n-57, Fort Morgan anticline in Morgan County, probably has been the subject of more rumors and conflicting reports than any wildcat drilled in the State for some time. Some of these, apparently coming from reliable sources, were to the effect that the Hygiene sand in the Pierre shale, considered a definite marker, had not been reached though the hole is far below where it was expected. Another, presumably equally reliable, said that this marker had been found much higher than expected and contained oil. Other reports were that the well was to be shut down and not completed. These are set at rest by a statement from official sources which says that the formations are running about normal, although the Hygiene sand probably is represented by sandy shale instead of sand; that this horizon did not carry oil and that the company has no intentions of shutting down the well which is drilling at this time in the lower part of the Pierre shale at 3,050 feet.

Arapahoe County

The McDeb Drilling Co.'s No. 1 Fitzsimmons, NE, Section 7-4s-66, near Aurora in Arapahoe County, is bottomed at 5,692 feet and for several weeks has been swedging out the 6¼-inch. This work has been about completed except for a few rough spots which interfere with swedge coming out. The well is being drilled for the Fitzsimmons Oil & Leasing Co. of which Rev. A. J. Finch, former head of the Anti-Saloon League of Colorado, is president. Lou Gorham, formerly with the Continental Oil Co., has been placed in charge of the drilling with W. H. Ingersoll as head driller. J. W. Merritt and others' No. 1 Union Pacific, SE cor. NW, Section 17-5s-64, Watkins district, is drilling below 1,551 feet in shale with a sand expected at around 1,585 feet. The hole will be carried to 1,600 feet and then the water supply system will be rearranged. At present water is being hauled to the location.

Adams County

Nettie M. Slatt's No. 1 Hills, SE cor., Section 27-3s-64, Watkins district, is drilling at 2,350 feet in shale. The drillers identify the formation as the Pierre which was topped 300 feet above the present bottom. Rainbows of oil have been showing on the slush pit for the past 300 feet.

Larimer County

The Poudre River Oil Co.'s No. 1 Warren, NE cor., Section 33-8n-69, 3 miles northwest of Fort Collins, has landed the 3½-inch on bottom at 3,599 feet and is ready to resume. It has been held up at this depth for three years with a bad fishing job. It is supposed to be in the Pennsylvanian formation and at 3,328 feet it topped a sand in which oil rose 60 feet, but was soon bailed down. It then went through 35 feet of shale and back into a sand showing some oil, but not in commercial quantities. It found the Frontier at 1,390-1,410 feet and topped the Muddy at 1,800 feet. This is the deepest test geologically in northern Colorado and is supposed to be on top of the objective horizon. The Continental Oil Co.'s No. 3 Scott, SW SE, Section 6-9-68, Wellington Dome, which is being deepened to the Lakota, is again cementing cavy ground below 4,585 feet. Same company's No. 1 Hoffman, SW NE, Section 23-4n-70, Deininger Dome, is drilling at 1,250 feet in the red beds. Frank E. Kistler, formerly president of the Producers & Refiners Corp. and later of Frank E. Kistler & Co., again is entering the oil business in this area and is interested in another well to be drilled on the Round Butte structure near the Wyoming line by Stanley M. Barrows. Standard rig is being erected on the location which is on the Munroe land in the C NW NE, Section 26-11n-69. Kistler has the offset lease. The location is 3½ miles west of No. 1 Barrows, which was drilled through the Sundance and had some good shows of oil. It will go to the Muddy sand at 1,700 feet. The location is the same upon which the Erbe Oil Co. was prepared to start a well but never spudded.

Weld County

The Platte Valley Petroleum Co.'s No. 1 Patterson, SW SW, Section 24-6n-61, Greasewood Dome, is bottomed at 6,540 feet in the Benton shale and is underreaming the 4¾-inch to bottom. It continues to have shows of gas in the shale. The Eastman Oil Co.'s No. 1 Steel, SE NE, Section 14-2n-67, is shut down at 165 feet.

Boulder County

The Lyons Oil & Refining Co.'s No. 1 Allen, NW NW, Section 17-2n-70, is bottomed at approximately 2,520 feet in shale between the Dakota and Lakota sand's and is reaming to run and set a string of 6¼-inch for a water shutoff. The hole was reported to have a show of oil at this depth supposedly coming from the Lakota.

Pueblo County

The Kuykendall Oil Corp.'s No. 1 Beecher, SW cor., Section 7-22-66, is drilling at 100 feet in the top of the Dakota formation.

Park County

The South Park Oil & Gas Co.'s No. 1 Esche, SE cor. NW, Section 5-9s-76, Muleshoe structure, is resuming at 445 feet after being shut down to open a coal mine nearby for a fuel supply. The South Park Oil Co., another concern, in its No. 1 Milligan, NE SE, Section 13-8s-76, is reported drilling in the Frontier at 1,400 feet and to have cut several sands. The first sand at 1,240 feet, is reported to have had a show of oil. The 8¼-inch will be run for a formation shutoff.

La Plata County

The E. B. Klem Petroleum Co.'s No. 1 Olbert, NW SW, Section 9-35-12, Thompson Park district, is running a string of special 4½-inch casing at a total depth of 2,623 feet. The hole is bottomed in blue shale just above the La Plata, or Sundance sand. The Murchison Oil Co.'s No. 1 Doescher, SW NW, Section 29-33-13w, Dry Mesa, is waiting at 600 feet for new water supply system to be completed. It is bottomed in the Mesa Verde formation in which shows of oil have been encountered. This is a rotary test to the Pennsylvanian.

Montezuma County

The Mesa Verde Ranch Co.'s No. 2 Haller, SW NW SE, Section 33-36-14w, Mount Lookout structure, was completed at 720 feet in a sand in the Dakota formation. Sand was topped at 693 feet. Gas flow gauged 90,000 feet a day. Same company's No. 3 Haller, NE SE SE, Section 33-36-14, is drilling at 380 feet. Gas was found in No. 1 Haller, which was drilled for water, and the company is seeking to determine the productive area in the shallow sand and to build up a supply for fuel before making a deep test for oil.

Mesa County

The Argo Oil Co.'s No. 1 Hoel, NE cor., Section 23-8s-104, High Line, after plugging back to 2,450 feet to sidetrack, is underreaming the 8¼-inch and cleaning out.

Garfield County

The Fulton Petroleum Co.'s No. 1 Smith, SE NE NW, Section 8-8s-102, Garmesa Dome, is drilling at 2,800 feet in the Mancos shale. The Dakota is expected at 2,850 feet and carried gas in an offset.

Routt County

The Texas Production Co.'s No. 4 Carstarphen, NW NW, Section 5-6n-86, Tow Creek, is drilling at 835 feet.

Moffat County

The Midwest Refining Co.'s No. 24 Hannewalt, SE SE, Section 4-6n-92, Bell Rock, is drilling by bit at a total depth of 3,042 feet. At 2,800 feet this hole, the pioneer well on the structure, entered a 25-foot sand that gauged 32,000,000 feet of gas from the Mesa Verde formation. More gas was encountered upon drilling deeper, but the operation has been delayed by casing and fishing troubles at present depth for several weeks. The Texas Production Co.'s No. 12 Knowlton, SW SE, Section 33-5n-91, Moffat Dome, is rigging up cable tools to complete. Hole is bottomed at 4,578 feet in the Sundance to which depth it was drilled with a rotary rig which was destroyed by fire. Same company's No. 4 Wick, NW NW, Section 10-4n-91, is reaming at 4,100 feet. S. H. Keoughan and others' No. 1 State, SW SW, Section 16-4n-101, Skull Creek, or Midland Ridge Dome, is drilling at 2,600 feet in lime. It entered the lime at this depth after being in shale from 2,160 feet on. The lime, measured on the outcrops, is about 130 feet thick.

WYOMING

Big Horn County

The opening of a new black oil field in the Big Horn Basin in Wyoming, proving a new producing horizon and pointing to great possibilities on other structures in that area, which was predicted in this column last week, is being fulfilled. The Ohio Oil Co.'s No. 1 Easton, NW SW NE, Section 33-56-97, on the Garland Dome, stopped drilling at 4,442 feet, more than 700 feet in the Madison lime, and bailed down the drilling water until the well began to flow by heads. A test of production was started at 8 o'clock Thursday morning and latest reports from the well are that it is flowing at the rate of 1,000 to 3,000 bbls. a day while cleaning itself of mud. The oil will test around 23 gravity, about the same as Oregon Basin crude, but has a smaller sulphur content. The lime was saturated the entire distance drilled and is the thickest producing horizon now developed in Wyoming. While several wells have been drilled to the Madison on other structures in the State, none revealed the possibilities of the formation to the extent of this well. Most of the tests drilled to that horizon have stopped shortly after entering it with two or three exceptions and these were nonproductive tests.

The Ohio's No. 1 Easton, a joint operation with the Utah Southern Oil Co., topped the Madison at around 3,700 feet. Big gas was encountered in the top, the first test to yield a large volume of gas in the Madison, and this was cased off at 3,887 feet with a string of 7⅝-inch casing. The gas gauged 58,000,000 feet a day with a pressure of 1,500 pounds. While oil was showing at the time the gas was cased off, there was more gas and the oil pay was topped at 4,988 feet. After drilling to 4,220 feet, operations stopped to unload the well and make a test, but this decision was reconsidered and the hole was deepened to 4,442 feet. A description of the structure was given in this report last week, it being about 10 miles long and 3 miles wide with a closure of between 2,600 and 3,000 feet. Four companies control most of the acreage on the structure and the discovery is being reflected in an active market for the shares of these companies. The Ohio Oil Co. probably controls in excess of 1,000 acres as it has been adding to its holdings during the past few weeks. The Producers & Refiners Corp., jointly with the Kinney-Coastal Oil Co., has 2,500 acres, in adition to which the first named has a permit on other acreage. The

Utah Southern Oil Co. has 860 acres. There are more than 50 structures in the Big Horn Basin which hold out possibilities in the deeper pay discovered on the Garland Dome. Some of these have oil and gas production in the upper formations, while several produce gas only. A number of them were barren in the younger formations. With the exception of Grass Creek and Frannie, and possibly one or two others, none of these have been drilled into the Madison. The Ohio Oil Co.'s No. 1 Union Gas, NE cor., Section 22-56-97, on the adjoining Byron Dome, came in a few months ago as an oil discovery with a production of 600 bbls. a day, but it did not go to the Madison. It stopped either in the lower part of the Tensleep or the upper Amsden. Last year the Midwest Refining Co. discovered oil in the Madison in its No. 36 Rosenberg, SE cor. NW, Section 25-58-98, on the Frannie Dome at 3,005-13½ feet. It had almost no gas, but flowed 2,424 bbls. in 24 hours. Subsequently water came in and the production dropped to 100 bbls. of oil, but later showed a considerable increase over the last named figure. The Midwest is now drilling two additional wells at Frannie.

Hot Springs County

The Midwest Refining Co.'s No. 8 Weeks, NW SE, Section 6-44-98, Wagonhound Dome, is drilling at 4,190 feet in light gray shale. It topped the Embar at 3,695 feet and had shows of oil, but not commercial, and drilling to the Tensleep was resumed. The last show of oil was at 3,935 feet.

Park County

The Midwest Refining Co.'s No. 31 Frannie Oil, SW cor. NE, Section 25-58-98, Frannie Dome, an offset on the east to the discovery in the Madison lime, is drilling at 3,220 feet in brown lime, and its No. 31 Rosenberg, SW cor. SE, Section 24-58-98, is drilling at 2,490 feet in gray shale. The Texas Production Co. is starting a new operation in Oregon Basin in its No. 2 Sonners, C SW SW, Section 20-51-100, an offset on the north to its No. 1 Sonners, and on the east to the Wyoming Western's No. 1 Hough. The Resolute Oil Co.'s No. 1, SW NE, Section 17-57-101, Badger Basin, is drilling below 7,300 feet and now probably has the record for the Rocky Mountain states, being about the same depth as A. A. Rollestone's well near Longmont, Colo., which went to 7,310 feet several years ago.

Natrona County

The Midwest Refining Co.'s No. 11 Middy, C NE NE, Section 23-35-79, Midway Dome, is still on a 10-day pumping test with the tubing 500 feet off bottom and averaging around 600 bbls. a day of which 29 per cent is water. When the string of special tubing is run to bottom, which will be done as soon as it arrives, another test will be made to determine what steps will be taken toward overcoming the water intrusion from the bottom. A refinery test of the crude showed 20 per cent gasoline, 7.2 per cent kerosene, 12.3 per cent gas oil and 60.5 per cent fuel oil. Specific gravity on the A.P.I. scale was 21.6 and sulphur content 0.4 per cent.

One completion in Salt Creek was reported in the Wyoming Associated Oil Co.'s No. 31-SD-3, which made 728 bbls. of oil and 7,128 bbls. of water from the third Sundance at 2,977-79 feet first 24 hours without being shot. The Midwest Oil Co.'s No. 8-SD-3, SE, Section 26-40-79, is drilling at 115 feet in shale with the Sundance as the objective.

The Wind River Oil & Gas Co.'s No. 1 DeLong, NE SE, Section 9-38-78, west of Teapot, ran into another water sand after setting the 6⅝-inch at 3,252 feet to shut off water in the first Wall Creek. A string of 5 3/16-inch will be run. The Empire State Oil Co.'s No. 6, SE cor., Section 12-33-83, Iron Mountain, is spudding. The company has five small wells in the upper horizons which are being prepared for pumping after being idle for some time. This structure formerly produced gas from the Embar and Tensleep at 1,200 to 2,200 feet, but the supply was exhausted. The Amsden and Madison have not been tested. The light oil found in small quantities is from the Frontier.

Weston County

Two completions in the Osage Field were reported this week. Nichols and others' No. 4, NE SE NW, Section 8-46-63, was completed as a 12-bbl. well in the shale, and the Osage Trust Co.'s No. 6, SW cor. SE, Section 14-46-64, flowed 140 bbls. in 16 hours from sand at 1,630-45 feet. James McCullough's No. 3 Logan McCullough, CWL NE NE, Section 23-46-64, is drilling at 1,000 feet, and Hugh Updike & Sons' No. 2, NE NE, Section 14-46-64, is drilling at 1,600 feet. The Yellowstone Petroleum Co.'s No. 1 McCullough, NE NW NE, Section 23-46-64, one screw in the sand at 1,790 feet, filled up with oil 1,400 feet in 14 hours. This well was drilled from the grass roots to the sands in 28 tours of 12 hours each. The Lambie Oil Co.'s No. 3 Bock, SW cor. NE, Section 14-46-64, is drilling at 1,100 feet, and its No. 4, SW NE, Section 14-46-64, is drilling at 1,300 feet. Same company's No. 5, NE SW NE, Section 14, is drilling at 200 feet. Straitiff & Curtis' No. 4, SE NE, Section 14-46-64, is drilling at 1,485 feet, and the Dexter Oil Co.'s No. 1, NE NE, Section 1-45-64, set the 10-inch at 1,040 feet. The Osage Trust Co.'s No. 7, NW SE, Section 14-46-64, is drilling at 1,400 feet, and its No. 8, NW cor. SE, Section 14-46-64, is drilling at 400 feet. Henderson, Garbereck and others' No. 1 Bock, SW cor., Section 2-46-64, has recovered tools and is cleaning out.

Fremont County

The Delta Oil Co.'s No. 2 Enos, Section 27-3n-1w, Pilot Butte, was deepened to 1,135 feet where it will be tubed and pumped. It is estimated at 50 bbls. initial. The company is reconditioning a well drilled on this tract five years ago by the Minnesota-Western Oil Co., but never pumped, and is running tubing to put it on production. It was drilled to 2,300 feet and was standing full of oil in the 10-inch when work started on it. The Beaver Divide Oil Co.'s No. 2, Section 17-27-95, Little Buffalo Basin, is estimated at 4,000,000 feet of gas at 1,320 feet in the second Wall Creek, with a show of green oil. This company, a subsidiary of the Standard Carbon Co., is drilling a series of wells to develop a supply of gas for a proposed carbon black plant. The Kinney-Coastal Oil Co.'s No. 1 Dykeman, SE SW, Section 22-3n-1w, Pilot Butte, is coring in red shale at 4,485 feet and is expecting the Sundance sand at any time. In the past 100 feet it has cut some anhydrite which is rather unusual in that formation in that area. The Texas Production Co.'s No. 1 State, SW SW, Section 36-34-95, Alkali Butte, is bottomed at 4,485 feet and swedging the bottom of the 6⅝-inch, which was set at 4,468 feet. The Producers & Refiners Corp.'s No. 2, NW SE NW, Section 33-34-92, Muskrat Dome, is coring in hard sand at 4,244 feet. This well is 1½ miles northwest of the big gas discovery well drilled in last year. It is being drilled with a rotary in an effort to go through the gas in the Frontier and test lower horizons for oil. Same company's No. 10, NW cor., Section 14-32-95, Big Sand Draw, which succeeded in penetrating the Frontier gas sands with a rotary, is bottomed at 3,631 feet and redrilling at 3,492 feet. It had heavy gas pressure in the first Dakota topped at 3,457 feet.

Gas is to be supplied to the Indians in the Shoshone and Arapahoe Indian reservation north of Lander by the New York Oil Co., which is constructing a 22-mile 4-inch line from Lander.

Carbon County

The Producers & Refiners' No. 3, SE NW, Section 2-19-88, Hatfield Dome, is bottomed at 4,240 feet and underreaming at 4,230 feet. The 4½-inch is at 4,200 feet. C. E. Bivens and others' No. 1 Red Feather, SE, Section 35-13-92, Baggs Dome, was completed as a gas well at 755 feet. It was not gauged, but is estimated at 3,000,000 to 6,000,000 feet a day. It was drilled to supply fuel for No. 1, SE SW SW, Section 35-13-92, which is preparing to resume at 2,300 feet. This well had approximately 25,000,000 feet of gas in a 12-foot sand topped at 2,160 feet, but the flow was greatly reduced by water standing on the sand during the winter. There was a show of oil below the gas and casing will be run before any new hole is made. The Producers & Refiners' No. 4, Section 7-26-89, Wertz Dome, made 10 feet of hole to 3,392 feet when it was held up by a fishing job. It is jarring on tools. This is a gas well being deepened.

Lincoln County

The Midwest Refining Co.'s No. 1 Larcher, SE SE, Section 25-37-117, Little Grays River, is drilling at 2,505 feet in red sand and lime, and the Wyoming Production Co.'s No. 1 Neill, SE NW, Section 14-24-113, Fontenelle, is drilling at 630 feet after setting the 12½-inch at 583 feet.

Sublet County

Fitzpatrick and others' No. 2 Elkhorn Oil, NE, Section 17-27-113, formerly Circle Oil Co., is redrilling at 500 feet and carrying the 12½-inch. This well was drilled to 1,015 feet last year. W. D. Newlon's No. 1, SW, Section 12-26-113, LaBarge, is drilling at 2,515 feet with a show of oil and gas. Casing was cemented at 2,380 feet to shut off gas and water.

Niobrara County

The Argo Oil Co.'s No. 7 Wehopeso, C SW NW, Section 19-39-60, Mule Creek Field, in which a discovery in the basal Minnelusa, or Pennsylvanian, was reported last week, has not made any new hole pending the erection of tanks. It cut a gray saturated sand at 3,167-70 feet and oil rose 2,500 feet in the hole. The total depth is 3,170 feet. The oil is 27 gravity instead of 37 gravity as first reported. The Bowser-Satterfield Syndicate's No. 1, NE NW, Section 7-35-62, Sage Creek, ran into water at 950 feet and is underreaming the 12½-inch. The Argo Oil Co.'s No. 1, SW NE, Section 33-36-65, Lance Creek, which was drilled to 3,100 feet in 1920, is preparing to deepen to the gas sand expected within 200 feet. The Ohio Oil Co.'s No. 4 Converse Sheep, SE SW SE, Section 32-36-65, Lance Creek, is cementing the 8⅝-inch casing on top of the Sundance at 3,612 feet. Gas is showing in the hole. After drilling out the cement, the sand will be tested. This is the pioneer well to the Sundance, all former production in the field coming from the Dakota sands.

MONTANA

In the Border Field, the result of shooting the Rice Radigan well has created considerable interest among the operators. This well found the lower sand and was plugged back to a small showing which did not test for a commercial well. A shot was tried and the well is now making 50 bbls. The result is likely to start a campaign of shooting in the new field.

The Canadian operators are realizing that some offsets should be drilled on the Canadian side of the line to protect acreage there. Several wells are now producing on the Montana side that may be draining oil from Canada. The No. 1 Sax is one of these that is thought to be taking some Canadian oil and the No. 2 Sax is to be spudded in in the near future. No. 1 Sax is making about 2,500 bbls. per month.

The next completion looked for in the Border Field is the Inland Petroleum Co.'s No. 2 which is showing some gas from the upper sand and is about 2,100 feet. It may reach the pay next week.

The interest shown in developing new gas producing and marketing areas has brought considerable new capital into Montana the past few months, one of the new companies, composed of New York capital, will drill several structures in the vicinity of Big Timber, Sweetgrass County. The new firm is the Shoshone Consolidated Oil Co. and seven wells are proposed to be drilled on acreage the company now controls. If gas is found, pipe line to convey it to nearby towns will be laid.

In the Cat Creek Field, the Minnesota Flatwillow Oil Co., drilling its No. 6 well, found a stray sand and a show of oil.

The Fulton interests drilling on a structure in the foothills of the mountains in Glacier Park, went into a stray sand that showed considerable oil.

In Powder River County, southeastern Montana, the Stallis Oil Co. of Chicago has leased a block of land south of Broadus on the Powder River and near the Wyoming line. The land is reported to contain a large structure and is to be drilled this fall.

Pipe Line Runs

Daily average pipe line runs from the various pools for the week ending September 27 follow:

WYOMING	
Salt Creek	30,330
Frannie	140
Big Muddy	1,940
Oregon Basin	2,500
Dutton	160
Elk Basin	830
Byron	890
Warm Springs	100
Lovell	...
Ferris	40
Grass Creek	2,100
Hamilton	880
LaBarge	1,880
Lance Creek	130
Lost Soldier	5,590
Osage	1,470
Poison Spider	400
Rock River	2,130
Simpson Ridge	50
Teapot Dome	40
Dallas-Derby	330
Hudson	210
South Casper Creek	840
Pilot Butte	370
Total	53,350
MONTANA	
Cat Creek	1,110
Kevin-Sunburst	6,100
Pondera	1,420
Lake Basin	80
Border	560
Total	9,270
COLORADO	
Moffat	1,247
Fort Collins	1,091
Florence	402
Iles	1,072
Tow Creek	367
Boulder	25
Rangley	50
Total	4,254
NEW MEXICO	
Hogback	410
Rattlesnake	1,117
Table Mesa	91
Artesia	590
Cap Rock (Maljamar)	330
Jal	1,345
Hobbs High	35,842
Lea City	4,931
Miscellaneous (Lea County)	669
Getty	212
Total	45,537
Grand total	112,411
Previous week	113,418
Difference	1,007

PANHANDLE FIELDS

(Continue from Page 122)

accept any price for their oil that they could secure. His company negotiated the construction of a refinery to remedy this situation and was obliged to enter into a contract with the builders of the refinery with a stipulated amount of crude oil.

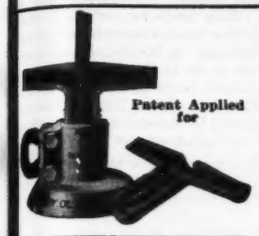
He also stated that his company had many wells shut down on top of the sand for many months, and had always co-operated in proration, and asked others to co-operate, but to no avail.

Mr. Danciger further stated: "The independent producers are not the ones overproducing, but the trouble lies in excessive drilling and building up enormous potentials in many fields throughout the country, and those having these enormous potentials are not seriously affected by prorating their wells as they run all they can handle anyway, whereas those operating in only one locality cannot exist under this program."

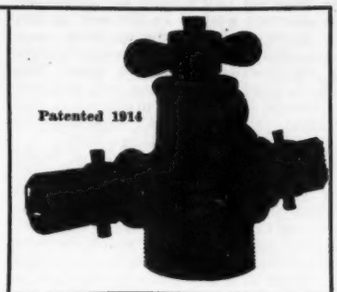
"It is our opinion that proration without the cessation of drilling and building up tremendous potentials is inconsistent and is based on a false foundation," said Mr. Danciger.

Suits by Commission

While Danciger Oil & Refining Co. was instituting one suit against the Railroad Commission, the commission was instituting another suit of similar import against Young Brothers and Alexander, operators in the Riggs Pool, Young County, in the Wichita Falls district. These operators are producing their wells at a maximum with the Primrose Refining Co. of Wichita Falls taking the oil at 25 cents below the posted price, and



LARKIN'S IMPROVED SAND PUMP



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Carefully and constantly improved—years of experience. That is why Larkin Products are *products you can trust.*

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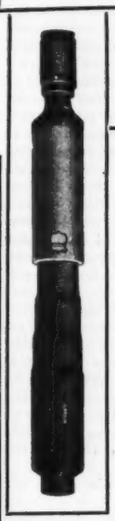
Common Style Larkin-Rigby Oil Saver Showing Hollow Top Grease Cup

Combination Anchor and Wall Packer—Conical Sleeve.

Hook Wall Packers (Patented)

Drilling Bit and Jars

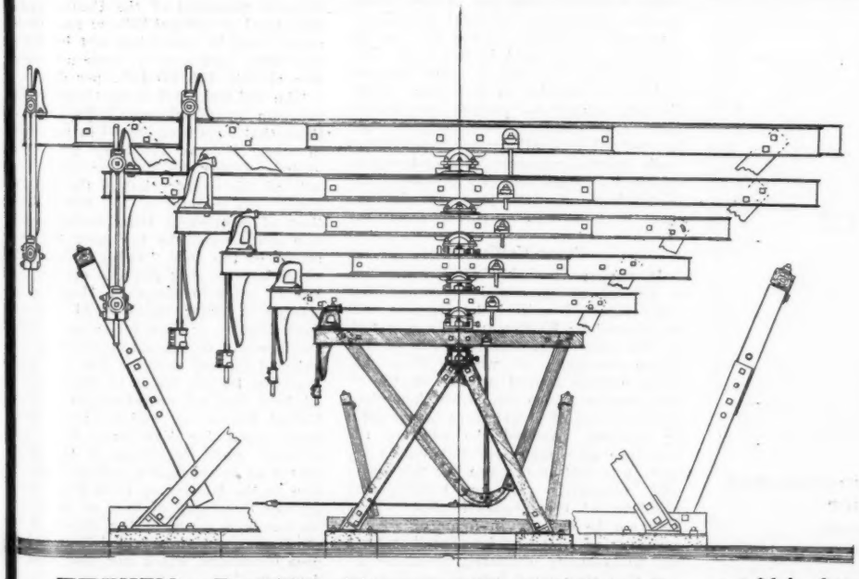


Larkin 3-in-1 Gas Anchor Packer

California Style Larkin-Rigby Oil Saver

LARKIN & CO.

BUTLER, PENNSYLVANIA, U.S.A.



The Controlled and Varied Leverage GOBLE UNDERPULL JACK

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The easy lift design by use of the Controlled and Varied Leverage can only be used in Goble Jacks—covered by fifteen patents, issued or pending.

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B. G. GOBLE MANUFACTURING CO.

Tulsa — Oklahoma

the Railroad Commission has authorized the attorney general to file suit against the operators for producing their properties in excess of the allowance named by the commission for this area. This will be another interesting suit, and will be closely followed by producers in the Wichita Falls district, especially in Young County and the Riggs Pool.

The American Refining Co. of Wichita Falls, effective 7 a.m. September 25, cut prices 25 cents below The Texas Company's posted price. The Panhandle Refining Co. cut 30 cents below the posted price on September 22 and Iowa Park refinery cut 30 cents below on September 23. Tidal Western Refining Co. is taking over the pipe line connections of the La Salle Refining Co. of Burkburnett, whose plant will be shut down as soon as present outside contracts are filled.

Wichita Falls Proration

Operators of the Wichita Falls district have formulated a plan to take before the directors' meeting preparatory to presenting it to the Texas Railroad Commission for relief for their district. Archer, Wilbarger, Wichita, Foard, Montague, Cooke, Baylor and Clay Counties have 13,257 wells, of which 10.640 average less than 6 bbls., the total from these wells being 28,000 bbls., about 2.7 bbls. per well. It is thought that under the marginal well rule to which the pipe line companies are adhering that this amount of oil is not subject to proration. Two thousand and seventeen wells are making more than 6 bbls. per well, totaling 46,000 bbls. per day. The total nominations by all companies purchasing oil in the district is 57,600 bbls., and a 39 per cent cut on wells above the marginal wells will cut the allowance to the desired amount.

The Magnolia Petroleum Co. and Gulf Production Co. are running 100 per cent in the counties in which they have production. Sinclair Pipe Line Co. is running 100 per cent in Wichita and cut in other counties. Prairie, Pure Oil Pipe Line Co., the Texas Pipe Line Co. and Humble Pipe Line Co. have cut various amounts in all the counties.

If the purchasing companies do not desire to prorate production of all wells above 6 bbls. to around 39 per cent, the operators will go before the Railroad Commission for the relief desired.

Coleman Wildcat

Wilmot and others' No. 1 Taylor, located in SW cor. of 40-acre Lilley small lease in A. Jasson Survey, about 1 mile west of Coleman in Coleman County, encountered Gardner sand carrying gas from 2,641-47 feet and an oil sand from 2,647-50 feet. The owners are running rods and tubing to pump. It is estimated good for a 40-bbl. well in wildcat area, opening more acreage to production.

Graham and others' No. 1 Sullivan. Section 136, Block 3, I.&G.N. Survey, on west side of Gray County, a semiwildcat discovery, was completed for an initial production of 500 bbls. per hour at total depth of 2,990 feet where it topped the pay opening up a new play in the area.

NORTH CENTRAL TEXAS COMPLETIONS

Archer County

H. H. Fraser's No. 1 Coleman, dry and abandoned, total depth 1,401 feet. Paul Trahan and others' No. 1 Netherton, dry and abandoned, total depth 1,605 feet. John Brownler's No. 1 Bell, dry and abandoned, total depth 1,197 feet. Flowers and Barkley and others' No. 1 Brezina and others, dry and abandoned, total depth 1,485 feet. H. P. Key's No. 1 Porter, dry and abandoned, total depth 1,502 feet. A. P. Nicholson's No. 1 Terrell, dry and abandoned, total depth 960 feet.

Cooke County

Deep Rock Oil Corp. of Tulsa's No. 1 Bugg, top pay 1,308 feet, plugged back to 1,348 feet, initial production 2½ bbls. of oil and 40 bbls. of water, total depth 1,370 feet.

Montague County

Bridwell Oil Co.'s No. 1 Salmon, dry and abandoned, total depth 1,936 feet. Carter and Rycade's No. 14 Cunningham and others, top pay 890 feet, initial production 22 bbls., total depth 912 feet.

Wichita County

Lambert and Trout's No. 7 Overby, top pay 1,247 feet, initial production 30 bbls., total depth 1,249 feet. Turman Oil Co.'s No. 20 Waggoner, top pay 1,718 feet, initial production 22 bbls. of oil and 6 bbls. of water, total depth 1,731 feet.

Wilbarger County

Patterson and others' No. 1 Waggoner, dry and abandoned, total depth 1,450 feet.

Young County

H. B. Alexander's No. 1 Clanda, dry and abandoned, total depth 660 feet. Arkansas Fuel Oil Co.'s No. 1 Jeffery, dry and abandoned, total depth 956 feet. Bob Elmore's No. 1 Andrews, dry and abandoned, total depth 955 feet. F. H. Gose's No. 1 Wilson and Allison, dry and abandoned, total depth 1,300 feet. Jack Harris' No. 1 Bullock and others, dry and abandoned, total depth 975 feet. Lloyd Oil Corp.'s No. 1 Furr and others, dry and abandoned, total depth 850 feet. Maer and Hamilton's No. 1 Bullock, dry and abandoned, total depth 908 feet. A. H. Park's No. 1 Johnson, dry and abandoned, total depth 640 feet. Petroleum Producers Co.'s No. 2 Graham, top pay 691 feet, initial production 205 bbls., total depth 698 feet. Willis and Terrell's No. 2 Belknap Cattle Co., dry and abandoned, total depth 702 feet. Wooten and Reed's No. 3 McBrayer and others, dry and abandoned, total depth 735 feet. Young Brothers and Alexander's No. 8 Remington, top pay 682 feet, initial production 56 bbls., total depth 706 feet. Cunningham and others' No. 5 Kisinger, top pay 2,497 feet, initial production 60 bbls., total depth 2,525 feet. Thompson and others' No. 1 Davis, dry and abandoned, total depth 1,002 feet.

NORTH TEXAS PRODUCTION
Week Ending September 27

Panhandle district—	Bbls.
Carson County	6,765
Hutchinson County	16,470
Gray County	53,730
Moore County	390
Potter County	None
Wheeler County	500
Total production this week	77,855
Total production last week	81,751
Decrease	3,896
Wichita Falls district—	
Archer County	12,835
Baylor County	1,070
Clay County	724
Cooke County	3,125
Foard County	161
Jack County	1,780
Haskell County	46
Montague County	6,345
Throckmorton County	615
Wilbarger County	16,075
Wichita County	22,655
Young County	9,245
Total production this week	74,676
Total production last week	76,274
Decrease	1,598
Ranger district—	
Brown County	5,670
Callahan County	2,851
Coleman County	2,341
Comanche County	1,121
Palo Pinto County	469
Eastland County	4,051
Shackelford County	5,185
Stephens County	5,345
Total production this week	27,033
Total production last week	26,976
Increase	57

COMPLETIONS IN PANHANDLE DISTRICT

Gray County

Tedesco Bell and others' No. 1 Morse, top pay 2,442-2,516 feet, shot 220 quarts, initial production 268 bbls., total depth 2,522 feet. Champlin Refining Co.'s No. 5 McLaughlin, total depth 2,925 feet, plugged back to 2,920 feet, initial production 35 bbls., top pay 2,865-75 feet. Cockrell-McIlroy Co.'s No. 1 Baer, top pay 3,280-86 feet, shot 240 quarts 3,220-86 feet, initial production 86 bbls. in 18 hours on pump, total depth 3,291 feet. Graham and others' No. 1 Sullivan, top pay 2,990 feet, initial production 5,000 bbls. oil and 59,000,000 feet of gas, total depth 2,990 feet. Wild and others' No. 1 Harrah, top pay 3,136-85 feet, shot 40 quarts, initial production 155 bbls., total depth 3,200 feet.

Hutchinson County

Plains Holding Co. and Hagy's No. 1 Johnson Brothers, initial production 23,500,000 feet of gas from 2,260-2,700 feet, total depth 2,705 feet.

Moore County

Shamrock Oil & Gas Co.'s No. 1 Brumley, deepened from 3,445 feet to 3,467 feet, top pay 3,435-45 feet, initial production 150 bbls. in 12 hours.

Wheeler County

Murchison and Fain's No. 1 Hanes, dry and abandoned, total depth 1,852 feet.

COMPLETIONS IN RANGER DISTRICT

Brown County

Eppenauer Drilling Co.'s No. 1 Shulus, total depth 2,110 feet, plugged back to 645 feet, initial production on pump 5 bbls. from sand 565-73 feet.

Callahan County

F. M. Taylor's No. 2 Biggerstaff, temporarily abandoned, total depth 355 feet.

Coleman County

Yingling and others' No. 1 Gates, dry and abandoned, total depth 2,915 feet.

Palo Pinto County

Christie Brothers' No. 2 Allen and Richie, dry and abandoned, total depth 1,312 feet.

Shackelford County

Coleman, Stiles and others' No. 1 Mitchell, dry and abandoned, total depth 2,185 feet. Horosely and others' No. 1 Casey, top pay 842 feet, initial production 10 bbls., total depth 857 feet. Meridian Oil Co.'s No. 1 Reynolds Land & Cattle Co., top pay 900 feet, initial production 20 bbls., total depth 901 feet.

Stephens County

Lone Star Gas Co.'s No. 2 Elliott, top pay 3,328 feet, initial production 265 bbls. oil with 1,000,000 feet of gas, total depth 3,358 feet.

Throckmorton County

C. F. Corzeliuis' No. 1 Irvin, dry and abandoned, total depth 1,502 feet.

NEW KETTLEMAN UNIT DEVELOPMENT PLAN

(Continued from Page 83)

gas. A revolving fund is created and each participant is expected to have a sufficient interest to safeguard the interests of all operators. The net receipts resulting from the sale of crude, natural gasoline and natural gas will be disbursed to members of the pool on the basis of acreage held in the pool. The present plan is rather comprehensive, and, while complex in structure, is sufficiently elastic to provide for unforeseen developments. Each company will be credited with all capital expenditures made up to the present time and will be expected to contribute its prorata share of funds required to prosecute development work as well as current operating expenses.

Favor Unification

It appears probable after contacting a number of interested operators that some form of unified development will be adopted by Kettleman Hills operators in the very near future. All of the major companies, as, well as those concerns holding proven acreage on top of the structure, have committee themselves to unification of development in one form or another. Around the edge of the structure some operators and lessors are note quite sold on the idea but this group will ultimately become participating members of the proposed plan. They may not be entirely in favor of pooling acreage for unit development but they will undoubtedly ultimately recognize the fact that they must become members of this co-operative organization for their own self-preservation. Unified development should have an especial appeal to operators and lessors holding acreage around the edge of the structure. Their advantage is due to the fact that under unified development they will continue to be participating members as long as the plan is operated, notwithstanding the favorable or unfavorable condition of the oil zone beneath the properties in question. If any operator around the edge of the structure decides to remain out he must buck edgewater intrusion and will sooner or later succumb to that condition. Under unified development edgewater intrusion can be regulated with the result that property around the edge of the structure will not depreciate in value. This tends to confirm the prevailing opinion among operators that unified development at Kettleman Hills will become operative in the near future, as the chief obstacle to overcome has been the inability to secure the indorsement of operators and lessors holding acreage down on the flank of the structure.

Chairman Issues Warning

The serious situation which would confront the industry if Kettleman Hills was allowed to produce without restraint prompted William Reinhardt, chairman of the Kettleman Hills North Dome curtailment committee, to issue a warning to all operators. Mr. Reinhardt's statement calls attention to the fact that "the Kettleman Hills Field of Fresno and Kings Counties, with its 13,000 acres of already proved productive area, its 33 wells capable of producing 90,000 bbls. per day of oil that is almost pure gasoline, and the feasibility of increasing this production to 200,000 or even 300,000 bbls. per day in the next year, is the cause of most serious concern to California oil operators. These wells produce large volumes of oil of such high quality that every barrel of crude produces nine-tenths of a barrel of gasoline. With this there is recovered another five-tenths of a barrel of casinghead gasoline from the natural gas accompanying the oil. In other words, the production of 1 bbl. of Kettleman Hills oil results in 1¼ bbls. of gasoline which the market must absorb. Inasmuch as the average barrel of refinable California crude yields only four-tenths of a barrel of gasoline, every barrel of Kettleman Hills production is equivalent to 3½ bbls. of ordinary California oil. With this in mind, it is not difficult to picture the results to the California gasoline market should competitive drilling and production start in Kettleman Hills, for 100,000 bbls. per day from that field would be equivalent to 350,000 bbls. per day of average California crude or 58 per cent of the present state production. California disposes of 128,000 bbls. of gasoline per day on the Pacific Coast, exports 60,000 bbls. per day and ships 58,000 bbls. per day to the Atlantic Seaboard of the United States. This total of 246,000 bbls. of gasoline demand could be completely met by Kettleman Hills with a daily crude oil production of only 175,000 bbls. per day.

"An old-fashioned competitive drilling program at Kettleman Hills, such as those that have been staged in past years in other fields of the State would seriously endanger the gasoline market not only of this country but of the world at large. On account of the initial heavy flow of Kettleman Hills wells, production costs would be low over the flush period of the field. Other fields would either have to shut down or operate at a loss in order to compete. However, operators in other fields could not shut down because of lease forfeitures and the result would be drastic competition with unheard of low prices. The net result would be terrific losses to the owners of oil land and oil operators all over the United States, as well as small immediate profit for Kettleman Hills landowners. Such disruption of the oil industry as would follow unbridled production in the Kettleman Hills Field would deprive thousands of men of work, and no one can estimate the effect of the shock such a blow would deliver to business conditions which are now woefully depressed."

Present Operations

The Standard Oil Co. cored the Bentonite marker in its well No. 65-J in Section 29-21-17 at 6,857 feet and this new well, a direct offset to the Superior Oil Co.'s No. 1 Huffman, a recent completion in the Kettleman Hills Field, will be brought into production shortly. A string of 9-inch casing is being run in and this will be landed on bottom at 6,880 feet preparatory to an early production test. The Superior has staked location for a second well on the Huffman lease and is rushing construction work ahead on its new casinghead gasoline plant which is being constructed by C. F. Braun & Co. Crude oil production of Kettleman Hills aggregated 24,675 bbls.

per day during the middle of the past week. Of this production, No. 1 Whepley of the Associated contributed 2,550 bbls., No. 8 Elliott of the Continental, 2,875 bbls.; No. 1 Elliott of the Milham Exploration, 1,725 bbls.; No. 1 Felix of the Petroleum Securities, 450 bbls.; No. 38 Fee of the Standard, 1,700 bbls.; No. 8 Fee of the Standard, 2,650 bbls.; No. 81 Fee of the Standard, 2,275 bbls., and No. 1 Huffman of the Superior, 10,450 bbls. per day. Several new projects are getting under way in the Kettleman Hills Field and additional drilling is projected for the near future.

Practically every major company has acquired holdings in the Kettleman Hills Field with the exception of the Union Oil Co. No. official reports have been issued by this concern but there is a persistent rumor that a deal of some kind has been consummated with the Pacific Western Oil Co. A merger of these two concerns would be mutually advantageous and highly beneficial to both but it is not likely that any consolidation will be effected because of the high value placed upon the Kettleman Hills holdings of the Pacific Western Oil Co. If this assumption is correct, the pending deal which is expected to be announced shortly presumably involves the acquisition by Union Oil Co. of some holdings held by Pacific Western Oil Co.

HUGOTON AREA HAS VAST GAS RESERVE

(Continued from Page 87)

wells completed with an open flow of 360,000,000 feet of natural gas.

Developments as of September 10, are as follows:

Operating companies in Field—	Gas wells comp.	Drlg.	Vol. natural gas
Argus Prod. Co.	59	24	360,000,000
Trees Oil Co.	6	..	40,000,000
McKnab-Mo.-Kans.	7	5	40,000,000
Pioneer	..	1	.....
Hardendorf	1	...	6,000,000
Total	73	30	446,000,000

It is interesting to note that the Argus Production Co. development has been guided by careful engineering advice. E. Thomas is the resident field geologist for the Argus Production Co., and is responsible for samples and field checking, and Messrs. Lee and Garlough, of Wichita, Kans., are the consulting engineers who make the classifications from the cores, and guide in new well locations. It is seldom that any new oil or gas project has followed a more careful studied engineering program.

The average gas well in the Hugoton area to date shows an open flow of 6,100,000 feet. When the 30 wells or more now drilling are completed the field should have an open flow of nearly 630,000,000 feet.

Size of Gas Wells

The natural gas wells average 6,100,000 feet daily flow but range in size from 1,250,000 to 17,000,000 cubic feet. However, most of the wells lie in the 5,000,000 to 7,000,000-foot range. It is doubtful if any wells much larger than 20,000,000 feet will be found within the producing limits in the zone now producing gas.

The average natural gas pressure is 440 pounds. This gas is sweet, or free from sulphur and carries 1,100 B.t.u. per cubic foot, a high grade gas. The high B.t.u. content of this gas and its sweet quality makes it unusually desirable, and this gas will probably be used to sweeten the Amarillo gas before it is used in the Middle Western cities.

160 Acres Per Gas Well

The unit for development in the Hugoton gas area is taken at 160 acres per well. Where lease conditions justify it a larger unit might be used. The land situation, however, justifies the 160-acre unit. This size unit should result in complete drainage of the gas.

The natural gasoline content of the Hugoton gas averages only .225 gallon per 1,000 feet. However, a plant costing $750,000 is now being built by the Argus Production Co. to obtain this gasoline from the Hugoton gas.

There are no surface beds of importance to give a clue to detailed geology. Topographic features suggest only a slight relationship between surface and subsurface features, so as yet the structural features of the Hugoton gas area have not been fully determined. Enough subsurface data are now available to show there is a marked major fold, striking slightly north of west. This major fold to date shows no western reversal, but there are well defined north and south components of dip and an east dip.

Minor folding on the major Hugoton arch may be defined by further drilling, as the well record's now suggest such local changes. However, the map accompanying this article is drawn using a 100-foot contour interval, and does not show the minor variations. A map of this nature must necessarily give a generalized rather than a detailed picture of the geological conditions.

There is as yet no reversal to the west, and it may be that the trapping of the gas in the Hugoton arch is largely due to differential porosity in the producing beds, which are very porous in some parts and tight in others. Also, such beds may thin and disappear westward. However, to date no westward productive limit can be set. It is, however, rather interesting to note that the best gas wells have generally been those highest on the structure.

Producing Gas Beds

The natural gas occurs in a porous, silicious dolomite, and also, there are beds of sand interspersed throughout the dolomite, which varies from 250 to 300 feet in thickness. Estimates of the porous zones in the dolomite range from 50 to 100 feet, based largely on core samples.

This dolomite occurs either at the base of the Permian red beds, or is upper Pennsylvanian in age; perhaps it represents a transition zone from Permian to Pennsylvanian beds. It lies immediately below 1,500 to 1,600 feet of red beds. The first gas occurs in the dolomite series, 350 feet more or less below the base of the heavy red beds. The range in well depth, 2,450 to 2,760 feet, varies with elevations, and the dip.

Possibilities of Deeper Sands

Two wells are now drilling by the Argus Production Co. to test for possible deeper oil or gas horizons. One of these is in Texas County, Oklahoma, and the other in Stevens County, Kansas. These tests are planned for 6,000 feet, or more, and should prove or disprove the presence of oil or additional gas reserves. There is a reasonable expectancy for favorable results from this deeper drilling.

As outlined, there are gas potentialities extending from Liberal, Seward County to Rolla, in Morton County, and from the Stevens-Stanton County line, to Guymon in Texas County, Oklahoma, a distance east to west of 40 miles, and north to south of 48 miles. All this area is not likely to prove productive. As yet the area between Liberal and Hugoton is largely undrilled, due to the occurrence of small gas wells, 1,500,000 to 2,000,000 feet in the Liberal area, but larger wells may be found. That part of the area, however, is potentially favorable for natural gas. Considering the whole area there are now known to be approximately 30 townships proven and semiproven, or 691,200 acres with much more probable acreage in sight as the gas reserve should extend into Grant and Stanton Counties on the north. No limits can be definitely set at this time as only drilling tests will define the natural gas area.

Any statement of natural gas reserves is only a reasonable estimate. At present there are 30 townships, of 23,040 acres each, that may be considered proven and semiproven acreage. This amounts to 691,200 acres. At 8,000,000 feet average recovery per acre, a conservative estimate, there is a reserve of 5,500,000,000 feet. The natural gas reserve will certainly extend beyond the limits given here, and give an additional gas yield. However, the present estimate shows that the field is an unusually large one.

These reserve figures are probably too low. The gas pressure is 440 pounds per square inch, the average pay thickness is taken at 60 feet, and the porosity at 18 per cent. The productive acreage will probably exceed the figures given above. This reserve is sufficient to take care of a withdrawal of 500,000,000 feet per day for 30 years.

REFUSAL OF PERMITS ARGUED IN BRIEFS

WASHINGTON, D. C., Sept. 29.—Briefs for and against the right of the Secretary of the Interior to reject all applications for oil and gas prospecting permits on the public domain have been filed in the court of appeals of the District of Columbia in the case of Wilbur against United States of America. This is known as the McLennan case. There are several other similar cases. The McLennan petition was allowed and the Secretary was directed to reinstate the applicant.

The applicant's brief contents that the President's statement issued to the press was not a legal withdrawal of land and was not a proclamation bearing the signature of the President, the official seal of the Government of the United States, attested by the Secretary of State. It was not made in conformity to the terms of the act of June 25, 1910, pertaining to such withdrawals.

The brief filed by the Government states that even in the absence of express statutory authority the President may temporarily withdraw public lands from the operation of an act of Congress which power exists independently of the act of 1910. There is no necessity to produce a formal proclamation or order in writing. This procedure has become a well-defined custom of the chief executive through usage of many years, having received the approval of Congress. The Government takes the position that the words "shall" and "authorized" as used in the leasing act shall be construed as discretionary and not mandatory.—C. E. K.

MISSISSIPPI FIELDS

(Continued from Page 127)

has been plugged back from 2,568 feet to 2,450 feet in an attempt to cut off the salt water. No. 1 Mayes is the discovery well in the Jackson Field and is estimated to be making several million feet of gas with a heavy flow of salt water.

The Southern Petroleum Co. encountered black shale at 2,416 feet in No. 1 Negro Investment Association, Section 12-5n-1e, Rankin County, and has cemented casing at 2,385 feet. There are five active drilling projects under way in the field, none having reached a depth near the producing horizon.

Coincident with this development at Jackson, other areas in Mississippi are also gradually becoming the scene of much activity.

The Amory Petroleum Co., of Amory, where two natural gas wells were brought in several years ago, has applied for a charter with a capitalization of $10,000,000. The Amory Natural Gas Co. and the Amory Petroleum Co., one the drilling and the other the distributing company, were acquired recently by the Mississippi Utilities Co., a subsidiary of the Southern Natural Gas Corp. Under the provisions of the Amory transaction the Mississippi Public Utilities Co. will construct pipe lines from the Amory Field to surrounding areas and the Amory Petroleum Co. will continue as a drilling firm in the area.

Two new wells are to be started at once at Amory. H. D. Easton, of Amory, and Gordon and Grigsby, of Brokaw, Dixon, Garner and McKee, of Shreveport, La., are now engaged in making locations for the two new tests.

The Ohio Oil Co.'s No. 1 Wells, NE cor., Section 16-15-5, Clay County, is drilling at 800 feet. The Mississippi Drilling Co. spudded in on the No. 1 Scarborough, Section 15-13-14, Winston County. The Vicksburg Oil & Gas Co. spudded in on the No. 1 Dornbush, Section 8-18-15, Warren County.

OZARK MAKES SURVEY

Ozark Chemical Co., manufacturer of sulphuric acid at Tulsa, recently issued a complete compilation of sulphuric acid plants of the United States. This booklet arranges the plants according to their locations in the various states and classifies them according to whether they are chamber plants, contact plants, and whether they manufacture their acid from by-product gas or from crude brimstone.

WILDCAT OPERATIONS IN TEXAS PANHANDLE

(Continued from Page 122)

GRAY COUNTY

Amalgamated German-American Oil Co.'s No. 1, Webb, 330 ft. S and W, E½ NW, Sec. 12, Blk. A-9, H.&G.N. Sur. ..... Drlg. 2,290 ft.

Anderson & Bean's No. 1 Thompson et al, 330 ft. S and W, NW, Sec. 126, Blk. 3, I.&G.N. Sur. ..... T.D. 3,234 ft; swbd. 150 bbls. in 24 hrs.

Atlantic Oil Prod. Co.'s No. 1 Reynolds, 330 ft. N and W, NE SE, Sec. 84, Blk. 3, I.&G.N. Sur. ..... S.D. 2,715 ft.

British-American Oil Co. and Shell Pet. Corp.'s No. 1 Smith, 330 ft. S and E, NW, Sec. 138, Blk. 3, I.&G.N. Sur. ..... Location.

British-American Oil Co. and Shell Pet. Corp.'s No. 1 Richardson, 330 ft. N and W, E½, Sec. 127, Blk. 3, I.&G.N. Sur. ..... Drlg. 1,765 ft.

Beck's No. 1 Sullivan, 330 ft. N and E, W½ NW, Sec. 135, Blk. 3, I.&G.N. Sur. ..... S.D. 400 ft.

Brown et al's No. 1 Willis, 330 ft. N and W, SE, Sec. 93, Blk. 3, I.&G.N. Sur. ..... Rig.

Cockrell-McIlroy's No. 2 Allam, 330 ft. N and W, E½ NE, Sec. 127, Blk. 3, I.&G.N. Sur. ..... Drlg. 880 ft.

Cockrell-McIlroy Oil Co.'s No. 1 Harbaugh, 1,263 ft. N, 330 ft. W, Lot 182, Sec. 114, Blk. 3, I.&G.N. Sur. ... Drlg. 2,092 ft.

Continental O'l Co.'s No. 1 Brown, 330 ft. S and W, Sec. 115, Blk. 3, I.&G.N. Sur. ..... S.D. 3,185 ft.

Kewanee O. & G. Co.'s No. 3 Arnold, 330 ft. N and E, SE, Sec. 149, Blk. 3, I.&G.N. Sur. ..... Drlg. 1,225 ft.

Danciger O. & R. Co.'s No. 1 McLaughlin, 330 ft. S and E, NW, Sec. 33, Blk. B-2, H.&G.N. Sur. ..... S.D. 2,863 ft; S.O. 2,361-63 ft.

Danciger O. & R. Co.'s No. 1 Catlin et al, 175 ft. S, 300 ft. E of N 71 ac. of E 231 ac., Sec. 57, Blk. 3, I.&G.N. Sur. ..... T.D. 3,120 ft; swbng. 12 to 16 bbls. per day.

Dulaney & Word's No. 1 Morse, 330 ft. S and W, Sec. 18, Blk. A-9, H.&G.N. Sur. ..... Location.

Dye & Gillette's No. 1 McConnell, 330 ft. N and W, W½ SE, Sec. 187, Blk. 3, I.&G.N. Sur. ..... Drlg. 3,208 ft.

Empire G. & F. Co.'s No. 2-B Archer, 330 ft. S and E, SW, Sec. 139, Blk. 3, I.&G.N. Sur. ..... Drlg. 1,200 ft.

Empire G. & F. Co.'s No. 2 Sailor, 330 ft. N and W, NE, Sec. 138, Blk. 3, I.&G.N. Sur. ..... Drlg. 1,210 ft.

Jean Pet. Co.'s No. 1 Furneaux Bros., 330 ft. N and W cor. SE, Sec. 200, Blk. B-2, H.&G.N. Sur. ..... S.D. 2,760 ft.

Magnolia Pet. Co.'s No. 1 Latham, 876 ft. N, 150 ft. E, Sec. 153, Blk. 3, I.&G.N. Sur. ..... Rig.

Magnolia Pet. Co.'s No. 1 Sailor, 990 ft. S, 330 ft. W, E½ NE, Sec. 138, Blk. 3, I.&G.N. Sur. ..... Drlg. 2,910 ft.

Magnolia Pet. Co.'s No. 2 Sailor, 330 ft. S and W, E½ NE, Sec. 138, Blk. 3, I.&G.N. Sur. ..... Cellar.

Midgray Oil Co.'s No. 1 McCullough, 267 ft. N, 150 ft. E of 246.9 acres in Sec. 153, Blk. 3, I.&G.N. Sur. ... Location.

Midwest Explin. Co.'s No. 1 Cobb, 1,320 ft. W, 400 ft. S, NW, Sec. 165, Blk. 3, I.&G.N. Sur. ..... T.D. 3,322 ft; T.P. 3,301 ft; C.O.

Nelson et al's No. 1 Crews, 330 ft. S and E, NW, Sec. 12, Blk. 25, H.&G.N. Sur. ..... Fishing for bit; T.D. 2,611 ft.

Operators R. & P. Co.'s No. 1 Arnold, 330 ft. S and E, E½ NE, Sec. 149, Blk. 3, I.&G.N. Sur. ..... Drlg. 2,635 ft.

Phillips Pet. Co.'s No. 1 Barrett, 132 ft. N, 470 ft. W, Sec. 126, Blk. 3, I.&G.N. Sur. ..... Cellar.
Prairie O. & G. Co.'s No. 1 Reynolds, 330 ft. S and E, NW, Sec. 84, Blk. 3, I.&G.N. Sur. ..... Drlg. 1,605 ft.
W. A. Scott's No. 1 Cobb, 330 ft. S, 425 ft. W, N½ SE, Sec. 134, Blk. 3, I.&G.N. Sur. ..... Drlg. 2,890 ft; estimated 4,000,000 ft. gas 2,875 ft.

Shamrock O. & G. Co.'s No. 1 Reynolds, 330 ft. N and E, SE SE, Sec. 84, Blk. 3, I.&G.N. Sur. ..... Drlg. 1,330 ft.
Skelly Oil Co.'s No. 1 Vicars, 330 ft. N and E, W½, Sec. 127, Blk. 3, I.&G.N. Sur. ..... Drlg. 750 ft.
Skelly Oil Co.'s No. 1 Heitholt, 150 ft. N, 3,806 ft. W, Sec. 153, Blk. 3, I.&G.N. Sur. ..... Location.
Skelly Oil Co.'s No 2 Vicars, 330 ft. N and W, SW, Sec. 127, Blk. 3, I.&G.N. Sur. ..... Derrick.
Smith's No. 1 Morse, 200 ft. S, 330 ft. W, Sec. 6, Blk. 26, H.&G.N. Sur. ..... 3,000,000 ft. gas 2,150-70 ft; S.D. 2,760 ft; 400 ft. oil in hole.

Southern Pet. Expltn. Co.'s No. 1 Baird, 330 ft. S and W, NW, Sec. 127, Blk. 3, I.&G.N. Sur. ..... Derrick.
Southern Expltn. Co.'s No. 2 Vaughn, 330 ft. S and E, SW, Sec. 138, Blk. 3, I.&G.N. Sur. ..... Drlg. 2,400 ft.
Sullivan & Ochiltree's No. 1-A Morse, 330 ft. S and W, N½ NE, Sec. 15, Blk. A-9, H.&G.N. Sur. ..... Rig.

HUTCHINSON COUNTY

Dixon Creek Oil Co.'s No. 1 Johnson Bros., 330 ft. N and W of E 60 ac. of NW 100 ac., Sec. 1, Blk. X03, H.&O.B. Sur. ..... Drlg. 1,420 ft.
Great Plains O. & G. Co.'s No. 1 Sanford, C of S 160 ac. of N 320 ac., Sec. 87, Blk. 46, H.&T.C. Sur. ..... S.D. 2,145 ft.
Huber & Co.'s No. 1 Christian, 330 ft. E, 990 ft. N, SW, Sec. 33, Blk. Y, A.&B. Sur. ..... T.D. 3,023 ft; C.O.
Huber Prod. Co.'s No. 1 Johnson Bros., 330 ft. N and E, E½ NW, Sec. 30, Blk. Y, A.&B. Sur. ..... Drlg. 1,210 ft.
Huber Prod. Co.'s No. 1 Johnson Bros. (Pure), 330 ft. S and E of E 240 ac., Sec. 29, Blk. Y, A.&B. Sur. .. Drlg. 2,040 ft.
Lanier et al's No. 1 Johnson Bros., 990 ft. S, 330 ft. E, W½ SE, Sec. 29, Blk. Y, A.&B. Sur. ..... S.D.
Phillips Pet. Co.'s No. 1-A Pease, 330 ft. S, 330 ft. E, Sec. 9½, Z. C. Collier Sur. ..... Drlg. 1,940 ft.
Phillips Pet. Co.'s No. 1 Herring, 330 ft. N and E, W½, Sec. 7, Blk. X02, H.&O.B. Sur. ..... T.D. 3,075 ft; to plug back.
Prairie O. & G. Co.'s No. 1 Read, C SW, J. M. McDonald Sur. ..... Drlg. 680 ft.
Sinclair O. & G. Co.'s No. 1 Johnson Bros., 330 ft. N and E, NW, Sec. 32, Blk. Y, A.&B. Sur. ..... S.G. 2,230-54 ft; S.D. 2,905 ft; fishing.

Sinclair O. & G. Co.'s No. 1-C Johnson Bros., 330 ft. N and W, NE, Sec. 32, Blk. Y, A.&B. Sur. ..... Drlg. 1,635 ft.
Skelly Oil Co.'s No. 1 Johnson Bros., 660 ft. S and W, SE, Sec. 30, Blk. Y, A.&B. Sur. ..... S.O. 2,065 ft. and 3,108-10 ft; S.D. 3,110 ft.

Spurlock et al's No. 1-A Christian, 440 ft. S, 330 ft. W, NE cor. SE SE, Sec. 33, Blk. Y ..... 60,000,000 ft. gas; S.D. 3,219 ft; shot 140 qts. 3,150-3,220 ft; C.O.

Stansylvanian Oil Co.'s No. 1 Whittenburg, 330 ft. S and W, Sec. 139, Blk. Z, E.L.&R.R. Sur. ..... S.D. 3,005 ft.

LIPSCOMB COUNTY

Brown et al's No. 1 Box T Ranch, SW NE, Sec. 612, H.&T.C. Sur. ..... S.G. 3,760 ft; S.D. 4,142 ft.
Okla. Public Service Co.'s No. 1 C. W. Jones, NE SW, Sec. 100, H.&T.C. Sur. ..... Lowering 5 3/16-in. csg; T.D. 5,003 ft.

LUBBOCK COUNTY

Center Oil Co.'s No. 1 Bowles Ranch ..... Small S.O. 1,133-40 ft; S.D. 4,167 ft.

MOORE COUNTY

Dana O. & G. Co.'s No. 1 R. Viey, 330 ft. N, 330 ft. E, W½ SE, Sec. 135, T.&N.O. Sur. ..... Location.
Delmar Oil Co.'s No. 1-A Jones, 330 ft. N, 990 ft. E, NW, Sec. 171, Blk. 3-T, T.&N.O. Sur. ..... Drlg. 1,810 ft.
Home Gas Co.'s No. 1 Reeder, 330 ft. N and W, N½ E½ NE, Sec. 191, Blk. 3-T, T.&N.O. Sur. ..... Set 12-in. csg. 755 ft.
Morton et al's No. 1 Rupert, 660 ft. N, 330 ft. E, NW, Sec. 191, Blk. 3-T, T.&N.O. Sur. ..... Cellar.
Sunray Oil Co.'s No. 1 C. R. Jones, 330 ft. E, 330 ft. S, W½ SW, Sec. 164, T.&N.O. Sur. ..... Drlg. 1,650 ft.
Sunray Oil Co.'s No. 2 Jones, 330 ft. S, 990 ft. E, W½ SW, Sec. 164, Blk. 3-T, T.&N.O. Sur. ..... Rig on ground.
Shamrock O. & G. Co.'s No. 1 Coffee, 330 ft. E, 330 ft. N, E 160-ac. tr., Sec. 355, H.&T.C. Sur. ..... Drlg. 2,440 ft.
Gulf Prod. Co.'s No. 1 Kilgore, C SW, Sec. 22, Blk. P. Mc., E.L.R.R. Sur. ..... Gas estimated 15,000,000 ft., 3,950-60 ft; T.D. 3,645 ft; to complete as gasser.

Texas Interstate P. L. Co.'s No. 1 Sneed, Jr., C NE, Sec. 48, Blk. 6-T, T.&N.O. Sur. ..... Location.

MOTLEY COUNTY

Matador Oil Corp.'s No. 1 Owens, C NE, Sec. 10, Blk. G, B.&B. Sur. ..... S.D. 580 ft.

OLDHAM COUNTY

Chambers et al's No. 1 Herring, CNL, Sec. 29, Blk. S, G.C.&S.F. Sur. ..... Drlg. 680 ft.

POTTER COUNTY

Canadian River Gas Co.'s No. 1 McBride estate "A," 4,950 ft. S, 330 ft. W, E½ S½, Sec. 98, Blk. 46, H.&T.C. Sur. ..... S.D. 2,000 ft.

RANDALL COUNTY

W. A. Patterson's No. 1 Palo Duro, Sec. 60, Blk. K-14... S.D. 1,250 ft.

ROBERTS COUNTY

Big Bend Oil Co.'s No. 1 Ledrick, Sec. 7, Blk. A-5..... Shot 10 qts. 5,270-93 ft; S.O. 5,283 ft; S.D. 5,992 ft.

WHEELER COUNTY

Magnolia Pet. Co.'s No. 2 Worley, 330 ft. N and W, NE, Sec. 39, Blk. 24, H.&G.N. Sur. ..... Drlg. 2,130 ft.
McGee et al's No. 1 Jolly, C NE, Sec. 15, Blk. A-8, H. &G.N. Sur. ..... T.D. 2,030 ft.
Lone Star Gas Co.'s No. 1 Purcell, 1,980 ft. S, 660 ft. E, Sec. 51, Blk. 17, H.&G.N. Sur. ..... S.D. 1,731 ft.
Murchison & Fain's No. 1 Brown, 200 ft. S, 250 ft. E, NE, Sec. 53, Blk. 23, H.&G.N. Sur. ..... Drlg. 500 ft.
Wischkamper et al's No. 1 Kiser, 330 ft. N and E of SW, Sec. 33, Blk. 17, H.&G.N. Sur. ..... S.D. 2,040 ft.
Woodley et al's No. 1 Sloss & Admire, 660 ft. N, 330 ft. E, Sec. 47, Blk. 13, H.&G.N. Sur. ..... S.D. 1,325 ft.
Vollmert's No. 1 Porter, 330 ft. S and E, NE, Sec. 15, Blk. 27, H.&G.N. Sur. ..... S.D.

WILDCAT OPERATIONS IN WEST TEXAS

(Continued from Page 121)

ECTOR COUNTY

C. P. Davis et al's No. 1 Hendricks, C SW Sec. 46, Blk. 42, Twp. 2s, T.&P. Sur. ..... Shut down 4,012 ft.; moving in new engine.

H. F. Wurtz' No. 1 E. A. Ibbetson et al, 330 ft. from N and E lines of NW Sec. 16, Blk. 46, Twp. 3s, G.M.M. Br.&A. Sur. ..... Shut down 2,375 ft.; sidetracked old hole at 1,000 ft.; total depth new hole 1,500 ft.

Simms Oil Co. et al's No. 4 University, 1,650 ft. from S and 1,320 ft. from E of Sec. 1, Blk. 35 ..... Drlg. 2,870 ft.
Skelly Oil Co. and Republic Prod. Co.'s No. 1 McKenzie, 990 ft. from S line and 330 ft. from E line of Sec. 38, Blk. 45, Twp. 2s, T.&P. Sur. ..... Shut down 3,750 ft.; flowed 11[illegible] bbls. on July 13; shut in for storage.

The Texas Company's No. 9 Connell, 330 ft. from N and 440 ft. from W of SE cor. Sec. 1, [illegible]ublic School Land.. Rigging up.

EL PASO COUNTY

Lane-The Texas Company's No. 1 Malone, 2,110 ft. from SW and NW of Section 46, J. M. Day Sur. ..... Shut down 3,089 ft.

FISHER COUNTY

Condor Pet. Co.'s No. 1 Wilson, 330 ft. from N and 1,200 ft. from W, Sec. 6, W. E. Richardson Sur. ..... Location.
Cranfill & Reynolds" No. 2 Flannigan, 330 ft. from S and E of W half of Section 200, B.B.B.&C. Sur. ..... 2,500 ft. oil in hole from 3,090-[illegible] ft; shut down 3,130 ft; plugged back to 3,124 ft.; no results from 10-qt. shot.

Cranfill & Reynolds' No. 3 Willingham, 330 ft. from S and E of Sec. 207, B.B.B.&C. Sur. ..... Drlg. 2,010 ft.
The Texas Company's No. 2-A Stephens, 330 ft. from S and E, Sec. 79, Blk. 1, H.&T.C. Sur. ..... Location.
The Texas Company's No. 1-B Teagarden, 1,990 ft. from S and 440 ft. from E, Sec. 8, W. F. Richardson Sur... Location.

GARZA COUNTY

Pandem Oil Corp.'s No. 1 Justice, 330 ft. from S and W of Sec. 12, Blk. 4, H.&G.N. Sur. ..... Spudded and shut down.

GLASSCOCK COUNTY

Timberlake & Snyder's No. 1 Meek, 2,310 ft. W and 1,600 ft. N of SE cor. Sec. 7, Blk. 34, Twp. 3s, T.&P. Sur... Total depth 2,956 ft.; shut down
World Oil Co.'s No. 3-C McDowell, 2,310 ft. from S and W of NE cor. Sec. 21, Blk. 34, Two. 2s, T.&P. Sur. ... Shut down 660 ft.

HOWARD COUNTY

Cosden Oil Co.'s No. 6 Roberts-A, 200 ft. N and E of SW cor. Sec. 129, Blk. 29 W.&N.W. Sur. ..... Sulphur water 1,433-46 ft.; shut down 1,456 ft.

G. F. Getty's No. 1 Snyder, Sec. 27, Blk. 10, Twp. 1s, SW cor. of NE of NE ..... Drlg. 1,470 ft.
Greene O. & R. Co. et al's No. 1 Denman, 330 ft. from N and W of E half of NE, Sec. 14, Blk. 30, Twp. 1s, T.&P. Sur. ..... Drlg. 2,220 ft.
Merriwether's No. 1 Smith, 150 ft. from S, 2,400 ft. from W, Sec. 45, Blk. 33 ..... 2,000 ft. water in hole; shut down 3,270 ft.; 2,000 ft. sulphur water in hole; will abandon.

Moody Oil Corp.'s No. 23-B Roberts, 990 ft. from N and W of Sec. 137, Blk. 29 ..... Shut down 261 ft.

HUDSPETH COUNTY

Theison's No. 1 University, 2,050 ft. from S and 2,225 ft. from E of Sec. 17, Blk. E ..... Spudded 35 ft. and shut down.
Western States Oil Co.'s No. 1 Gardner & Moseley, NE NW Sec. 12, Blk. 18 ..... Shut down 3,155 ft.
Williams & Williams Drlg. Co.'s No. 1 Noelke, 200 ft. from N and 1,020 ft. from E of Sec. 8, City of San Antonio Sur. ..... Machine.

IRION COUNTY

Bristow et al's No. 1 Nutt, 180 ft. from NW of SW of NW Sec. 6, Gonzales County School Land ..... Shut down 1,465 ft.; to test; to pay 1,448 ft.; hole full oil.

Crawford Oil Co.'s No. 1 Williams, 450 ft. from N, 150 ft. from W, Sur'd. 8 ..... Shut down 1,105 ft.
Cromwell et al's No. 1 Tankersley, 150 ft. from N and 210 ft. from W of E half of Sec. 1,320, G.C.&S.F. Sur... Shut down 1,712 ft.; show oil 1,621-25 ft.

Straughn & Texannati Oil Co.'s No. 1 Tankersley, 150 ft. from S and 750 ft. from W of Sec. 4, Gonzales County School Land ..... Total depth 900 ft.; underreaming 8¼-in. casing.

P. H. Williams' No. 1 Ash, C of Sec. 20, Washington County ..... Shut down 3,900 ft.; may drill deeper.

Webb et al's No. 1 Nutt, 150 ft. from S and 116 ft. from W of Blk. 5, Gonzales County School Land ..... Location.
F. F. Webb's No. 1 W. H. Williams, 200 ft. from E and 750 ft. from S line, SW of NE Sec. 10, Gonzales County School Land ..... Shut down 100 ft.

JONES COUNTY

Pope et al's No. 1 Swann, 2,023 ft. from S and 400 ft. from E of I. Miley Sur. No. 381 ..... Drlg. 1,100 ft.

LOVING COUNTY

Arkansas Fuel Oil Co.'s No. 1 Dean, 990 ft. from NE and 2,310 ft. from SE, Sec. 84, Blk. 1, W.&N.W. Sur. ..... Total depth 675 ft.; running 10-in. casing.

Eppenauer et al's No. 1 Allen, 2,310 ft. from NE and NW lines, Sec. 90, Blk. 1, W.&N.W. Sur. ..... Drlg. 650 ft.
Lockhart & Co.'s No. 3 Bowen & Wells, 330 ft. from NE and SE of Sec. 92, Blk. 1, W.&N.W. Sur. ..... Shut down 3,383 ft.
Henshaw et al's No. 1 Reagan & McElvain, 990 ft. from SE and 330 ft. from SW, Sec. 34, Blk. 1, W.&N.W. Sur. ..... Total depth 4,254 ft.; top pay 4,248 ft.; flowing 250 bbls. per day.

Independent O. & G. Co.'s No. 2 Wheat, 990 ft. from NW and 330 ft. from SW, Sec. 85, Blk. 1, W.&N.W. Sur... Location.
Lockhart & Co.'s No. 2 fee, 676 ft. S, 330 ft. W, Sec. 91, Blk. 1, W.&N.W. Sur. ..... Spudded 140 ft.; shut down.
Lockhart & Co.'s No. 3 Hubbard, 1,650 ft. from NE line, 330 ft. NW line of Sec. 83, Blk. 33, H.&T.C. Sur. .... Rigged up and shut down.
Miller et al's No. 1 Chapman, 225 ft. from NW and 285 ft. from SW line, Sec. 71, Blk. 1, W.&N.W. Sur. ..... Shut down 3,160 ft.
Slagel Drlg. Co.'s No. 1 Cartwright et al, 2,310 ft. from S and 990 ft. from W, Sec. 1, Blk. 57, Twp. 1, T.&P. Sur. ..... Location.
California Co.'s No. 5 Reagan & McElvain, 990 ft. from NW and 330 ft. from NE of Sec. 84, Blk. 1, W.&N.W. Sur. ..... Location.
California Co.'s No. 4 Reagan & McElvain, 330 ft. from NE and 1,650 ft. from NW, Sec. 84, Blk. 1, W.&N.W. Sur. ..... Drlg. 4,170 ft.
Lee O. White et al's No. 1 Russell et al, 320 ft. from NW and 3,200 ft. from SW, Sec. 80, Blk. 1, W.&N.W. Sur. ..... Shut down 4,085 ft.

MENARD COUNTY

Barnett et al's No. 3 Callan City Co., 300 ft. from S and W, Sec. 1, B.S.&F. Sur. ..... Show oil 709-11 ft.; shut down 1,270 ft.

Barnett et al's No. 4 Callan City Co., 1,200 ft. from S and 2,200 ft. from W, Sec. 1, B.S.&F. Sur. ..... Machine.
Panhandle Ref. Co.'s No. 2 Eckhart, 1,820 ft. from W and 1,320 ft. from S of Sec. 10, Blk. 2, T.W.N.G. Sur. ..... 500,000 ft. gas with show oil 2,945 ft.; shut down 3,200 ft. to plug back to 2,955 ft. to save gas.

Priest's No. 1 Sorrell, 1,000 ft. from E and 200 ft. from S cor. Sec. 132, E.L.R.R. Sur. ..... Shut down 2,490 ft.

MIDLAND COUNTY

Kerwin et al's No. 3 Mathen, 2,310 ft. from N and 335 ft. from W line, Sec. 40, W. L. Gray Sur. ..... Spudded and shut down.

MITCHELL COUNTY

Morrison et al's No. 2 Morrison, 2,390 ft. from N and 660 ft. from E of Sec. 31, Blk. 28, Twp. 1n, T.&P. Sur. ..... Shut down 3,112 ft.
Morrison et al's No. 1 Poe et al, 660 ft. S and 1,980 ft. W, parallel to section lines of NE cor. Sec. 8, Blk. 27, T.&P. Sur. ..... Spudded 10 ft. and shut down.

PECOS COUNTY

Barnes et al's No. 1 Sanford, 160 ft. from NW and 157 ft. from SW of Sec. 55, Blk. 10, H.&G.N. Sur. ..... Cleaning out 1,380 ft.; top pay 1,350 ft.

Curry & Fakin's No. 1 Pecos Valley Oil Co., 1,050 ft. from SE and 1,470 ft. from SW, Sec. 36, Blk. 3, H.&T.C. Sur. ..... Shut down 1,629 ft.; top pay 1,[illegible] ft.; flowed 45 bbls. first 3 days

GUESSING

is always a

BONEHEAD STUNT

No one but a Bonehead will smoke where there is any possibility of EXPLOSIVE GAS

WERNER

"Accidents can MID-CONTINENT OIL & GAS ASSOCIATION be prevented"

Dittman's No. 1 Jackson, 2,310 ft. from NE and 330 ft. from NW, Sec. 28, Blk. 3, H.&T.C. Sur. — Location.
Dittman's No. 1 Eaton, 2,310 ft. from SW and NW, Sec. 35, Blk. 3, H.&T.C. Sur. — Drlg. 573 ft.
Dittman's No. 2 Eaton, 990 ft. from SW and 330 ft. from SE, Sec. 35, Blk. 3, H.&T.C. Sur. — Location.
Dittman's No. 1 Eaton, 330 ft. from NE and SE, Sec. 37, Blk. 3, H.&T.C. Sur. — Location.
G. A. Henshaw, Jr., Inc.'s No. 1 University, 1,650 ft. from S and 990 ft. from E, Sec. 32, Blk. 16 — Fishing 1,878 ft.
Humble O.1 & Ref. Co.'s No. 1 Kokernot, 1,320 ft. from N line and 1,467 ft. from W line of Sec. 227, Blk. 10, G.H.&S.A. Sur. — Shut down 5,035 ft.
Humble Oil & Ref. Co.'s No. 1-B Thoman, 1,608 ft. from N and 4,062 ft. from E of Sec. 98, Blk. OW, G.C.&S.F. Sur. — Drlg. 1,575 ft.
Lewis & Slagel's No. 1 Bell, 330 ft. from N and W of SE Sec. 13, Blk. 30, Twp. 1s, T.&P. Sur. — Location.
Lockhart & Co.'s No. 1 University, C NE of SW Sec. 24, Blk. 16 — Drlg. 590 ft.
Magnolia Pet. Co.'s No. 1 Byrne, 2,490 ft. from SE and SW, Sec. 54, Blk. 10, H.&G.N. Sur. — Drlg. 1,323 ft.
McCurdy & Brown's No. 2 Tippett, 150 ft. from N and W of SE, Sec. 40, Blk. 194, G.C.&S.F. Sur. — Location.
Messenger et al's No. 2 Byrne, 2,490 ft. from NE and SE of Sec. 54, Blk. 10, H.&G.N. Sur. — Top pay 1,364 ft.; flowed 110 bbls. in 3 days; total depth 1,398 ft.
Messenger et al's No. 1 Butz, 1,830 ft. from NW and 1,170 ft. from SW, Sec. 54, Blk. 10, H.&G.N. Sur. — Shut down 740 ft.
J. R. Miller et al's No. 1 Bennett, 359 ft. W of CWL Sec. 1, Blk. 119, G.C.&S.F. Sur. — Shut down 1,700 ft.
J. D. O'Mara's No. 1 Bennett, Sec. 593, 1,460 ft. from S, 150 ft. from E, G.C.&S.F. Sur. — Total depth 1,230 ft.; top pay 1,089 ft.; plugged back to 1,185 ft.; will drill deeper.
J. D. O'Mara's No. 1 Streety, S of Sec. 1, W. P. Howard Sur. — Drlg. by tools 2,210 ft.
Oregon Oil Corp.'s No. 2 Yates, 150 ft. from S and W of Sec. 58, Blk. 1, I.&G.N. Sur. — Shut down 2,440 ft.
Perren Oil Co.'s No. 2 Eaton, C of E of W, Sec. 27, Blk. 3, H.&T.C. Sur. — Drlg. 1,763 ft.; est. 5,000,000 ft. gas at 1,760 ft.
Plymouth Oil Co.'s No. 1 Perry, 330 ft. from N and W, Sec. 13, Blk. 194, G.C.&S.F. Sur. — Total depth 1,920 ft.; top pay 1,892 ft.; flowing 25 bbls. per day.
Plymouth Oil Co.'s No. 4 Perry, 300 ft. from N and 420 ft. from E, Sec. 14, Blk. 194, G.C.&S.F. Sur. — Shut down 1,785 ft.
R. W. Porpus et al's No. 1 State Land, 330 ft. S and W lines of NE, Sec. 28, Blk. OW, T.C. Sur. — Spudded and shut down.
Pure Oil Co.'s No. 1 Harrison, 2,310 ft. from N and 330 ft. from W of Sec. 203, Blk. 3, T.&P. Sur. — Drlg. 2,118 ft.
Riser & White's No. 1 Riser, 2,297 ft. from S and 997 ft. from E of Sec. 24, Blk. 12, H.&G.N. Sur. — Shut down 405 ft.
Sides & Cloyd's No. 2 Blackstone & Slaughter, C NW of Sec. 34, Blk. A-2, T.C. Sur. — Total depth 2,330 ft.; drlg. up bailer.
California Co. et al's No. 1 Thomas, 990 ft. from NW and SW, Sec. 31, Blk. 34, H.&T.C. Sur. — Location.
The Texas Company's No. 1 Wright, 660 ft. S and E of NW cor. Sec. 9, Blk. 131 T.&St.L. Sur. — Shut down 3,504 ft.
Warner's No. 1 Webb, 2,550 ft. from NW and 6,100 ft. from NE of Sec. 311, Abst. 756, C. McGinley Sur. — Drlg. 985 ft.
Williams & Moran's No. 1 Heiner Est., 450 ft. from N and 2,490 ft. from W of Sec. 590, G.C.&S.F. Sur. — Drlg. 240 ft.

PRESIDIO COUNTY

L. C. Brite's No. 4 Brite, 271 ft. from N and 1,188 ft. from E lines of Sec. 245, Blk. 4 — Shut down 3,129 ft.

REAGAN COUNTY

Big Lake Oil Co.'s No. 4-C University, 1,120 ft. from N and 1,096 ft. from E of Sec. 1, Blk. 2 — Drlg. 8,468 ft.; top pay 8,220 ft.
Big Lake Oil Co.'s No. 5-C University, 625 ft. from S and 200 ft. from W of Sec. 25, Blk. 9 — Drlg. 3,898 ft.
Texon O. & L. Co.'s No. 4-B University, 1,130 ft. from N and W of Sec. 26, Blk. 9 — Drlg. 3,244 ft.

REEVES COUNTY

H. T. Hansford's No. 1 Williams, 150 ft. from S and W, Sec. 17, Blk. 6, H.&G.N. Sur. — Shut down 380 ft.
Black & Kink's No. 1 Brooks, 1,980 ft. N and 660 ft. W, Sec. 16, Blk. 50 — Shut down 1,860 ft.; show oil 1,820 ft.; cleaning out after two shots; filled up 200 ft. with oil.
Riggs & Smith's No. 1 Lee Monroe, 2,390 ft. from NE and 330 ft. from NW line, Sec. 34, Blk. 7, H.&L.N. Sur. — Spudded and shut down 85 ft.
Salsbury & Gregory's No. 1 Young Bell, 1,170 ft. from N and 330 ft. from E of Sec. 7, Blk. 5, H.&G.N. Sur. — Temporarily abandoned.
Lee O. White et al's No. 1 Hershersor, 330 ft. from N and W lines of Sec. 5, Blk. 51, Twp.10, T.&P. Sur. — Shut down 4,415 ft.
California Co.'s No. 1 Kloh & Rumsey, 1,650 ft. from S and E of Sec. 13, Blk. 54, Twp. 4, T.&P. Sur. — Shut down 3,604 ft.; fishing bailer; show oil and gas 3,588-89 ft.

RUNNELS COUNTY

Dutton et al's No. 1 Dean, 5,475 ft. from NE and 1,048 ft. from NW in J. Heil Sur. No. 419 — Shut down 1,330 ft.
George W. Boyce's No. 1 Lang, 2,310 ft. N, 6,900 ft. E, Sec. 262 — Show oil 2,028 ft.; shut down 2,643 ft.

SCHLEICHER COUNTY

Delmar Oil Co.'s No. 1 O'Harrow, C of NW Sec. 56, Blk. 1, G.H.&S.A. Sur. — Shut down 5,472 ft.; show gas 5,460-63 ft.
Interstate's No. 1 Whitten, 1,320 ft. from N and W, Sec. 35, Blk. LL, T.C. Sur. — Plugging back to shoot oil and gas show at 4,915-25 ft.; total depth 6,880 ft.
Teas & Gant's No. 1 Allison, 1,320 ft. N and E of SW cor. of Sec. 37, Blk. K, G.H.&S.A. Sur. — Shut down 3,837 ft.
Wesner et al's No. 1 Nicks, 2,310 ft. from N and 2,262 ft. from E of Sec. 77, Blk. LL, T.C. Sur. — Shut down 750 ft.
Westyde et al's No. 1 Meador, 1,320 ft. from S and E of Sec. 661, G.C.&S.F. Sur. — Location.
George Wilson's No. 1 Page, Sec. 40, Blk. L, 1,290 ft. from N, 1,470 ft. from W, G.H.&S.A. Sur. — Shut down 5,027 ft.

SCURRY COUNTY

Byrd & Harmon's No. 1 Murphy, Jr., 320 ft. from N and E of Sec. 114, Blk. 97, H.&T.C. Sur. — Hole full oil; total depth 3,501 ft.; running tubing.
Camp Spring Oil & Ref. Co.'s No. 3 Guinn, 1,300 ft. from S, 300 ft. from E. Sec. 12, Blk. 3, H.&T.C. Sur. — Plugging 4,373 ft.
Camp Spring Oil Co.'s No. 1 Strayhorn, 330 ft. from S and 1,980 ft. from W of Sec. 154, Blk. 3, H.&G.N. Sur. — Drlg. 775 ft.
I. B. Mimms et al's No. 1 J. J. Koonsman, Sec. 216, Blk. 2, H.&T.C. Sur. — Spudded and shut down.
G. E. Dickmen and R. B. Pender et al's No. 1 F. C. Davis, 1,000 ft. N and 1,770 ft. W of SE cor. of Sec. 275, Blk. 2, H.&T.C. Sur. — Shut down 4,970 ft.
Seifert & Dibble's No. 1 T. M. Blackburn, 2,310 ft. from N and 2,310 ft. from W line of Sec. 155, Blk. 97, H.&T.C. Sur. — Cellar.
Mid-Kansas O. & G. Co.'s No. 1 Peckham, 330 ft. from S and W of R. N. Miller Sur. — Drlg. 4,008 ft.

STERLING COUNTY

Beesley et al's No. 1 Brown, 2,940 ft. N and 300 ft. W of SW cor. Sec. 7, Blk. 22, H.&T.C. Sur., but in Sec. 16, Blk. 21, Twp. 4s, T.&P. Sur. — Spudded.

SUTTON COUNTY

Independent Oil & Gas Co.'s No. 1 Wilson, Sec. 30, Blk. A, 1,650 ft. from N, 2,310 ft. from W — Location.

TAYLOR COUNTY

Adams et al's No. 2 Lowe, 150 ft. from N and 750 ft. from W, Sec. 19, Guadalupe County School Land — Rigging up.
Clark et al's No. 1 Kendall, 250 ft. from N and W of farm in Willis Avery Sur. — Shut down 2,545 ft.; to abandon.
Gibson & Johnson's No. 1 Bingham, 330 ft. N and E of SW cor. their 270.8-acre tract, Sec. 31, Guadalupe County School Land — Shut down 2,501 ft.
John B. Jameson's No. 1 Webb, 1,170 ft. S and W of NE cor. Sec. 46, Lunatic Asylum Land — Show oil 4,917 ft.; drlg. 6,170 ft.
Hucony Oil Co. et al's No. 1 Richie, C SE Sec. 10, Blk. A, S.P. Sur. — Shut down 2,230 ft.
Sanger et al's No. 1 City of Abilene, 830 ft. from S and 1,400 ft. from E of Sec. 66, Blind Asylum Land — Drlg. 385 ft.
Sanger O. & R. Co.'s No. 1 Osborn, 330 ft. from SW of SE Sec. 68, Blind Asylum Land — Rigged up and shut down.

TERRELL COUNTY

Big Bend Oil Co.'s No. 1 Bassett, C NW Sec. 155, Blk. D, M.-K.-T. Sur. — Drlg. 2,240 ft.
Keck Pecos Trust Co.'s No. 1 Hamilton, C Sec. 6, Georgetown Ry. Sur. — Shut down 3,150 ft.
Miller Bros.' No. 1 Allison & Burke, C NW cor. Sec. 10, Blk. 176, T.&P. Sur. — Shut down 120 ft.
Mrs. J. B. McPhees' No. 1 Sam Belt, C Sec. 16, Blk. D-7, E.L. Sur. — Shut down 880 ft.; moved off machine.
Transcontinental Oil Co.'s No. 1 Goode, 2,152 ft. from E and 330 ft. from S, Sec. 26, Blk. 161, G.C.&S.F. Sur. — Fishing 5,229 ft.
Woodley & Jones' No. 1 Pankenham, C SE NW Sec. 43, Blk. B-2, C.C.S.D.&N.G. Sur. — Shut down 640 ft.

TOM GREEN COUNTY

Belding & Dutton's No. 1 Nosworthy, 2,640 ft. from S and 587 ft. from E of John McNeese Sur. — Drlg. 760 ft.
Cosden Oil Co.'s No. 1 William Anson, 2,310 ft. S, 330 ft. W of NE cor. Sec. 20, Blk. 24, H.&T.C. Sur. — Location.
Fitzgerald & Taliaferro's No. 1 Bennett, C SW Sec. 1,628, E. H. Dinger Sur. — Plugged back to 2,405 ft. to straighten hole; shut down 2,447 ft.
Mintex Oil Co.'s No. 1 Campbell Est., 446 ft. from S and 630 ft. from W of Sec. 180, Dist. No. 11, S.P. Sur. — Shut down 1,704 ft.
Phillips Pet. Corp.'s No. 1 Gulden, 1,250 ft. from N and 1,583 ft. W of Sec. 77, James Webb Sur. — Total depth 3,600 ft.; underreaming 8¼-in. casing.
E. W. Wiley et al's No. 1 Maier, 200 ft. from E, 110 ft. from N, Sec. 6, Blind Asylum Land — Shut down 815 ft.

UPTON COUNTY

Cordova Union Land Co.'s No. 1 fee, 330 ft. from S and E line of Sec. 1, Blk. 1, M.-K.-T. Sur. — Location.
Eppenauer's No. 4 W. A. Chaney, 1,650 ft. from N and W lines of Sec. 18, Blk. 3, M.-K.-T. Sur. — Drlg. 350 ft.
Gulf Prod. Co.'s No. 1 King Ranch Oil & Lignite Co., 330 ft. from S and 990 ft. from W line, Sec. 28, Blk. 2, M.-K.-T. Sur. — Drlg. 800 ft.
Penn and Shell Pet. Corp.'s No. 1 Anderson, 1,320 ft. from S and E, Sec. 37, Blk. Y, C.C.S.D.&R.G.N.G. Sur. — Drlg. 125 ft.

VAL VERDE COUNTY

Independent Operators' No. 1 Whitehead, SE SE Sec. 30, Blk. 4, I.&G.N. Sur., elev. 1,175 ft. — Shut down 5,360 ft.
O. O. Owen's No. 1 Mills, Sec. 128, Blk. 1, I.&G.N. Sur., elev. 2,130 ft. — Shut down 6,760 ft.
Phantom Oil Co.'s No. 1 Ingram, 175 ft. W of E line and 300 ft. N of S line, Sec. 33, Blk. D-8, E.L. Sur. — Show oil 1,525 ft.; fishing 3,035 ft.; may skid over and start new hole.
Valvert Oil Corp.'s No. 1 Bassett, C NE Sec. 47, Blk. Y. — Shut down 4,009 ft.

WARD COUNTY

Great Basin Oil Co.'s No. 1 Eudaley, 2,140 ft. from NW and 1,170 ft. from SW, Sec. 36, Blk. 4, H.&T.C. Sur. — Completed as dry at 1,700 ft. on April 4, 1928.
Gulf Prod. Co.'s No. 5 Hutchings, 330 ft. from S and W, Sec. 3, Blk. F, G.M.M.B.&A. Sur. — Drlg. 2,660 ft.; 190 bbls. per day.
Gulf Prod. Co.'s No. 3 Wristen Bros., 220 ft. NE of SW and 220 ft. SE of NW Sec. 18, Blk. 5, H.&T.C. Sur. — Show gas 1,960-70 ft.; filling up with sulphur water 2,520-77 ft.; salt water 2,545 ft.; plugged back to 2,477 ft.
Gulf Prod. Co.'s No. 13 O'Brien, 330 ft. from S and 2,310 ft. from W, Sec. 6, Blk. F, G.M.M.B.&A. Sur. — Top pay 2,578 ft.; flowed 1,835 bbls. in 15 hrs.; total depth 2,600 ft.
Magnolia Pet. Co.'s No. 1 Sealy, 330 ft. from S and E of NE cor. Sec. 46, Blk. 2, G.M.M.B.&A. Sur. — Drlg. 1,950 ft.
R. F. Owens' No. 1 Johnson, 100 ft. from NE and 1,100 ft. from SE of Sec. 8, Blk. 33, H.&T.C. Sur. — Shut down 1,200 ft.
Penn and Atlantic's No. 1-B Pecos Mercantile Co., 990 ft. from NW and 2,310 ft. from NE, Sec. 16, Blk. 34, H.&T.C. Sur. — Shut down 2,607 ft.; flowing 29 bbls. oil and 10 bbls. salt water per day; will probably shoot.
Richardson et al's No. 4 O'Brien et al, 330 ft. from N and 2,340 ft. from W, Sec. 5, Blk. F, G.M.M.B.&A. Sur. — Total depth 2,795 ft.; flowed 326 bbls. first 24 hrs.; top pay 2,572-79 ft.
Richardson et al's No. 5 O'Brien et al, 330 ft. from N and 2,970 ft. from W of Sec. 5, Blk. F, G.M.M.B.&A. Sur. — Location.
California Co. et al's No. 1 Lanham, 990 ft. from NE and SE, Sec. 35, Blk. 34, H.&T.C. Sur. — Location.
Tex-Ok Prod. Co.'s No. 1 Redman, 1,980 ft. NE of SW line and 1,980 ft. SE of NW line, Sec. 152, Blk. 34, H.&T.C. Sur. — Shut down 5,077 ft.; show oil 5,070 ft.; shot 140 qts. from 5,047-77 ft.; no results.
Shipley et al's No. 5 Havzlett, assume common line Secs. 16 and 17 is N and S, 220 ft. S and 1,910 ft. W, Sec. 17, Blk. 5 — Standard rig.
Shipley et al's No. 1 Monroe, 330 ft. SE SW Sec. 3, Blk. 1 — Shut down 2,520 ft.
T. P. Coal & Oil Co.'s No. 1 Barker, 330 ft. from SW and NW of Sec. 27, Blk. B-29, Public School Land — Drlg. 1,650 ft.

WINKLER COUNTY

Empire Gas & Fuel Co.'s No. 1-C Daugherty, 990 ft. from S and 2,310 ft. from E, Sec. 16, Blk. 74, Public School Land — Drlg. 335 ft.
Magnolia Pet. Co.'s No. 1 Bashara, 1,650 ft. from S and 2,310 ft. from W, Sec. 17, Blk. B-3, P.S.L. Sur. — Location.
Magnolia Pet. Co.'s No. 3 Scarborough, 1,650 ft. from N and 990 ft. from W of Sec. 1, Blk. 77, Public School Land — Drlg. 750 ft.
A. W. Phillips' No. 2 Brown et al, 2,000 ft. S and W of NE Sec. 4, Blk. B-5, Public School Land — Shut down 3,120 ft.
Prairie Oil & Gas Co.'s No. 1 Johnson, 2,310 ft. N and E, Sec. 16, Blk. 74, Public School Land — Drlg. 360 ft.
Liner Drlg. Co.'s No. 1 Campbell, 330 ft. from N and E cor. Sec. 2, Blk. B-5 — Shut down 4,639 ft.
Shell and The Texas Company's No. 1-B Cowden, 660 ft. from S and W of Sec. 39, Blk. B-5, Public School Land — Shut down 3,116 ft.; top pay 2,585 ft.; flowing 124 bbls. per day, 40 per cent water; shut in.
Turman et al's No. 1 Daugherty, 2,310 ft. from E and 2,310 ft. from S line, Sec. 16, Blk. 74, Public School Land — Total depth 475 ft.; drlg. water well.

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The High Cost of Gasoline Surplus

If Stocks Are Not Reduced by April Effect on Price Level Will Mean Loss of $400,000,000 to the Industry Next Year

By Joseph E. Pogue
Consulting Engineer, New York City*

The petroleum industry entered the current business depression with large inventories, a tremendous potential overproduction of crude oil, and a refining capacity grossly in excess of even normal requirements. That it has been able to traverse the intricacies of this trying period with only a sacrifice of earning power, but thus far without disaster, is suggestive that the oil business is applying economic principles foreign to its older operations. But the battle is not yet won. Up to the present, the industry has been following defensive tactics. The time has now arrived to take the offensive and the purpose of this talk is to suggest a program which, if followed, should insure for 1931 a reasonable reward to the oil industry.

The petroleum industry has demonstrated that faced with adversity it can hold back the supply of both crude petroleum and gasoline. This is now a fact accomplished and current equilibrium between supply and demand has been attained. With this condition arrived at, there are doubtless some who wonder why the price structure is so weak and where, after all, is the advantage of balancing supply and demand if profitable prices are not immediately forthcoming. Those who hold to this view are overlooking the existence of an important adverse economic factor, which must be met and solved before a sound statistical condition can prevail and the reward of price improvement may be enjoyed. Reference is had, of course, to the burdensome inventories that now oppress the oil market. These inventories are the accumulative result of overproduction in the past and these excesses logically constitute the problem to which the industry should now address itself. Fortunately the idea is gaining ground in the industry that excessive inventories constitute an economic liability and the more enlightened companies are seeking to reduce the magnitude of this very serious handicap.

On July 31, 1930, there were 687,000,000 bbls. of oil in storage in the United States; probably twice the volume needed for working stocks. Of this quantity, 524,000,000 bbls. was crude oil, while 163,000,000 bbls. were petroleum products. Of the latter, 46,000,000 bbls. was gasoline. And of this quantity of gasoline, 10,000,000 bbls. may be regarded as the price-breaking excess above liberal working stocks. Now, as gasoline is the money crop in the oil business, it may be concluded that it is this 10,000,000 bbls. of surplus gasoline that is preventing the industry from benefiting constructively from its accomplishment in balancing current supply and demand—that is, indeed, threatening a prolongation of the depression in which the industry finds itself.

Must Liquidate Surplus

If this be the case, then the question arises: Why not liquidate this surplus? That is precisely what the constructive thought in the industry is advocating and what every member of the industry, whether producer or refiner, should seek to bring about—and in the shortest time consonant with reason.

Unfortunately, this objective is not easy of attainment. One reason is that the normal growth in the demand for gasoline, already in process of decelerating (in this country, at least), is further retarded by the business depression which is gripping the entire world. In 1929, the demand for gasoline enjoyed a rate of increase of 13.5 per cent; during the first nine months of 1930, this rate had fallen to 8.9 per cent; while during the summer, the rate has dropped to around 3 per cent or so. This circumstance is a serious matter, for the country is involved in no ordinary depression and its duration cannot yet be clearly foreseen.

*Before National Petroleum Association, Atlantic City.

TABLE 1—EFFECT ON THE GASOLINE CARRY-OVER OF APRIL 1, 1931, OF MAINTAINING THE JULY RATE OF GASOLINE SUPPLY AT VARYING RATES OF INCREASE IN DEMAND
(In millions of barrels)
Period covered: August, 1930, to March, 1931, inclusive.

Increase in demand %	Actual demand	Supply at July, 1930, rate	Change in stocks	Stocks July 31, 1930	Stocks Mar. 31, 1931	Actual stocks Mar. 31, 1930	Change in carry-over Apr. 1, 1931, from April 1, 1930
0	290.4	312.0	+21.6	46.1	67.7	55.2	+12.5
2	296.2	312.0	+15.8	46.1	61.9	55.2	+ 6.7
4	302.0	312.0	+10.0	46.1	56.1	55.2	+ 0.9
6	307.8	312.0	+ 4.2	46.1	50.3	55.2	— 4.9
8	313.6	312.0	— 1.6	46.1	44.5	55.2	—10.7
10	319.4	312.0	— 7.4	46.1	38.7	55.2	—16.5

On the basis of the argument given above, we will set up the objective that on April 1, 1931, the carry-over of gasoline should be 10,000,000 bbls. less than the carry-over into the spring of 1930—that is, stocks of gasoline should be 45,200,000 bbls., instead of 55,200,000 bbls., the level on April 1 last. April 1 next is specified because it will be difficult to bring about the desired liquidation before that time and also because of the size of gasoline stocks on April 1 sets the tempo of the gasoline market for the entire ensuing season.

What must be done to bring about a liquidation of the spring carry-over to the tune of 10,000,000 bbls. depends upon demand and the adjustment of supply thereto. The gasoline demand is inelastic; that is it is not susceptible to material increase through a lowering of prices; it is therefore beyond the control of the industry. The supply of gasoline, however, is what the industry elects to produce and hence is subject to control. (It is also elastic and quite sensitive to changes in price.) Unfortunately we do not know what the demand for gasoline is going to be between July 31, 1930, and April 1, 1931; but we do know that it is influenced by the business depression and is going to be disappointing. We can certainly not expect it to be as good, relatively, as during the first seven months of this year; we know it has been, relatively, extremely bad during the summer.

Figuring Future Stocks

Let us, therefore, approach the problem by taking two datum points—the July (1930) rate of supply and the desired carry-over for next spring—and observe what the results will be under varying degrees of increase in demand. This is done in Table 1. It is there seen that with no increase in demand, the July rate of supply will result in stocks April 1 next of 67,700,000 bbls., an increase in the carry-over of 12,500,000 bbls. Such an outcome of course would spell disaster for the industry. Looking at the table further, it will be observed that a 4 per cent increase in demand will be required to break even on the carry-over and an 8 per cent increase in demand will be necessary to reduce the carry-over to the desired degree of 10,000,000 bbls. It is apparent, therefore, how very dependent the immediate fortunes of the oil industry are upon relatively small variations in demand. Unfortunately, under conditions now prevailing, there is no way in which an accurate estimate of gasoline consumption may be arrived at. That it will be relatively low is practically assured. The industry should view this factor realistically. It will doubtless lie somewhere between 0 and 8 per cent, and will probably run above rather than below the dividing line between these two limits. If the demand factor should be 6 per cent, say, then the July rate of gasoline supply is too high for correcting the carry-over by April; an additional curtailment of 1.6 per cent from the July rate of supply would have to be made if this additional curtailment were to be concentrated in the item of domestic crude run to stills, then the runs would have to be reduced 84,000 bbls. daily below the July runs, or to 2,453,000 bbls. per day and this level adhered to without increase until April 1, 1931.

Effect on 1931 Income

It is not necessary, however, to know what gasoline demand is going to be, in order to correct the gasoline situation, or to lay out a program for that objective. With gasoline stocks at 46,100,000 bbls. on July 31, 1930, and a level of 45,200,000 bbls. the objective for April 1, 1931, it is possible to calculate what stocks should be each intervening month in order to register steady progress toward the objective. Table 2 gives the results of such a calculation and sets forth a deadline which, if not exceeded, will bring about a correction of the statistical position of gasoline by April 1 of next year.

In as much as the supply of gasoline is elastic (i.e., responsive to price), the desired objective will be more readily reached under a low price level. Present unfavorable price levels therefore should be regarded as advantageous to this end. Any tendency to peg prices above their natural levels, or to advance prices prematurely, would be harmful to the sound correction of the situation.

In conclusion, it cannot be emphasized too strongly that gasoline stocks must be liquidated substantially, if 1931 is to be at all a favorable year. At the same time, it may be pointed out that this goal is within reach of the industry, if every refiner becomes imbued with this idea and is determined that in no month up to next April shall gasoline stocks be permitted to exceed the levels shown in Table 2. Ten million barrels of surplus gasoline in storage is a fair measure of what stands in the way of improved earnings next year. It is probable that the maintenance of this surplus will create a price level 2 cents a gallon below what would be realized if the surplus is eliminated, and hence the failure to bring about this liquidation would effect the 1931 income of the industry adversely to the tune of $400,000,000. One is justified, therefore, in referring to the high cost of carrying surplus gasoline in storage.

TABLE 2—PROPOSED COURSE OF GASOLINE STOCKS BY MONTHS FROM AUGUST, 1930, TO MARCH, 1931, TO INSURE A CORRECTION OF THE STATISTICAL POSITION OF GASOLINE BY APRIL 1, 1931
(In millions of barrels)

1930—July		*46.1
Aug.		39.2
Sept.		37.4
Oct.		36.2
Nov.		37.6
Dec.		39.7
1931—Jan.		43.2
Feb.		44.5
Mar.		†45.2

*Actual stocks at refineries on July 31, 1930. †Desired objective on April 1, 1931. Stocks of gasoline on April 1, 1930, were 55,200,000 bbls.

RELATIONSHIPS BETWEEN MOTOR CAR, AIRPLANE AND PETROLEUM INDUSTRY

By Col. Paul Henderson
Executive Vice President, National Air Transport*

A few years ago, a few men, some well qualified and others with still much to learn, were endeavoring to make motor cars that might be commercially successful. The basis of their effort was the fact that gasoline, until then more or less of a nuisance to the people in the petroleum business, when sucked into an engine of certain design through an instrument, which they called a carburetor, created power which was reasonably flexible and which might be hooked up so as to make a vehicle move along the road. I feel that I am qualified to state just how crude some of these first efforts were because in 1902, as a youngster just out of school, my first commercial job was in the motor car industry.

The designers and builders of the motor cars of that date had very little to deal with; materials for construction purposes were very limited. Their greatest asset was probably the interest of the American public in a self-propelled vehicle. Cast iron they knew about, and the earlier designers used it liberally, much to the disgust of the men who were trying to keep pace with the development and furnish pneumatic tires that would hold these vehicles off of the roadways. They knew and used several alloys of copper. They had aluminum which they were able to cast in a crude sort of way, and they delighted to make shiny coach work of wood, paint and varnish. When a design failed because it was not strong enough, the only remedy was a greater size, with consequent increases in weight and not always increased smoothness of operation. They needed new metals, and alloys which would be light, and at the same time strong. The money with which to encourage research and development along the line of their need would have been impossible to find if it were not for the extreme patience of the public.

Evolution of Motor Car

That public in those years, between 1900 and 1905, to 1908, bought automobiles liberally, expected to have difficulty with them, enjoyed their pleasant as well as their unpleasant experiences, scrapped their cars and bought other cars. It was the dollars thus enthusiastically poured into this new business that enabled a very intensive development in metallurgy to quickly place in the hands of the automobile manufacturers new and wonder-

(Continued on Page 414)

*Before National Petroleum Association, Atlantic City, N. J.

WILDCAT OPERATIONS IN LOUISIANA-ARKANSAS

(Continued from Page 100)

Baugh et al's No. 1 Alexander, 330 ft. S, 330 ft. W, NE cor., Sec. 27-20-8 ..... Drlg. shale and boulders 1,650 ft.
El Dorado Chief Oil Co.'s No. 1 Dance, C SW NE, Sec. 27-20-7 ..... S.D. 2,240 ft.
Triangle Drlg. Co.'s No. 1 Brownfield, 660 ft. S, 660 ft. E, NW cor. NE, Sec. 6-19-5 ..... Rig up.
Triangle Drlg. Co.'s No. 1 J. W. Stevenson, 670 ft. N, 665 ft. W, SE cor. SW SE, Sec. 6-19-5 ..... Rig up.

CONCORDIA PARISH

A. C. Glassell's No. 1 Pecania Plantation, 25 ft. S, 25 ft. W, NE cor. irregular Sec. 46-8-9 ..... Location.
Joe Marr et al's No. 1 Maxwell, C, Sec. 35-3n-8e ..... Drlg. 3,845 ft.

DE SOTO PARISH

Joe Burnham et al's No. 1 Mary Hood, 320 ft. W, 201 ft. S, NE cor. SE SE NE, Sec. 3-11-14 ..... Oil show 8 ft. sand; T.D. 2,360 ft; bailed dry; estimated 1,000,000 ft. gas 2,726-27 ft; S.D; W.O. 2,762 ft.
J. W. Clark's No. 1 Tidwell, NW cor. NW, Sec. 22-13-14 .. Rig up.
S. A. Guy's No. 1 Dowling Bros., 469 ft. E, 382 ft. S, NW cor. NE, Sec. 31-14-14 ..... Began drlg. Sept. 23; drlg. 100 ft.
Bud Harrell's No. 1 Horton, 450 ft. E, 150 ft. N, SW cor. Sec. 4-11-11 ..... S.D. 1,060 ft.
Holly Oil Co.'s No. 1 Talbot (was Philp et al's), 220 ft. S, 730 ft. W, NE cor. NW NE, Sec. 9-13-13 ..... Began drlg. Sept. 13; cmtd. 12½-in. 67 ft.
Michlouzanna O. & G. Co.'s No. 1 Payne, 410 ft. S, 398 ft. E, NW cor., Sec. 12-11-16 ..... S.D. 2,600 ft.
Odell & Lawton's No. 1 Tidwell-Tull, 300 ft. N, 600 ft. E, SW cor. NW, Sec. 11-13-14 ..... S.W; show gas 3,004 ft; cmtd. bottom.
Pelham & Bunby's No. 1 Rhodes, C S½ SE, Sec. 32-13-14 ..... Pumped 35 bbls. oil per hr. for 2 hrs; then fresh wtr., then S.W; pumping; T.D. 3,009 ft.
R. O. Roy's No. 2 Nelson, SE cor. SE, Sec. 35-15-13 ..... Drlg. 800 ft.
Keatchie O. & G. Co.'s No. 1 Hallie Smith (was H. E. Weichert's), NE SE, Sec. 31-14-15 ..... Rig up.

MOREHOUSE PARISH

Pelican Nat. Gas Co.'s No. 1 Tensas Delta Land Co., 1,320 ft. N, 660 ft. E, NW cor., Sec. 17-18-6 ..... D.S. test 2,661 ft. dry; igneous rock 2,663 ft.

NATCHITOCHES PARISH

W. M. Coats' No. 1 Collins, 730 ft. N, 50 ft. E, C, Sec. 28-9-10 ..... S.D. 2,605 ft.
J. W. Cooper et al's No. 1 Cooper, NW SW, Sec. 35-11-10 Top chalk 1,280 ft; set D.S. and packer 1,280 ft; bailing small S.G; T.D. 1,290 ft.
Cooper et al's No. 1 La. Delta Pecan Co., C SE SE, Sec. 32-11-10 ..... Began drlg. Sept. 15; drlg. 810 ft.
S. D. McDaniel's No. 2 Clark & Morse, 800 ft. E, 350 ft. N, C, Sec. 23-5-6 ..... Tested 1,000,000 ft. gas and S.W. 3 ft; S.D. for orders; T.D. 2,536 ft.

RED RIVER PARISH

R. C. Lucas' No. 1 La. Pecan Co., Sec. 26-13-11 ..... Bailed down 1,000 ft; blew in estimated 2,000,000 ft. gas and show oil; 17-ft. sand; W.O.S.R; T.D. 2,476 ft.
Lucky Strike Oil Co.'s No. 1 Chaffraix, 200 ft. S, 200 ft. E, C, Sec. 33-12-10 ..... S.D; repairing rig 2,575 ft.
T. G. Shaw's No. 1 Wilkerson, SE SE, Sec. 4-12-10 ..... Began drlg. Sept. 22; cmtd. 10-in. 210 ft.

RICHLAND PARISH

W. C. Feazel's No. 1 Landrum, 620 ft. N, 4,573 ft. E, SW cor., Sec. 6-16-7 ..... Derrick.
Island Gas Co.'s No. 1 Noe, 1,902 ft. N, 660 ft. W, SE cor., Sec. 3-16-5 ..... Drlg. 2,365 ft.
Palmer Corp.'s No. 11 Rhymes England Planting Co., 2,033 ft. W, 660 ft. S, NE cor. NE, Sec. 12-16-5 ..... Cmtd. 6-in. 2,300 ft.

SABINE PARISH

Boone, trustee's No. 1 Turner, 40 ft. N, 140 ft. W, SE cor. NW NW, Sec. 4-7-11 ..... Rig up.
Franks et al's No. 1 Hays, 200 ft. N, 300 ft. E, SW cor. SE, Sec. 22-8-11 ..... Rig up.
Lide et al's No. 1 Ponder, 990 ft. N, 990 ft. W, C, Sec. 15-7-11 ..... Rig up.
Lohman & Walker's No. 1 Hubley, 330 ft. N, 330 ft. W. SE cor. SE NE, Sec. 21-7-11 ..... D.S. test 2-ft. sand 1,356 ft; dry; S.D. 2,100 ft.
Lohman et al's No. 1 Wyatt Lbr. Co., 150 ft. S, 330 ft. E, NW cor. NE SW, Sec. 18-4-11 ..... Rig up.
Longoria et al's No. 1 Belton, 330 ft. S, 330 ft. E, C, NE, Sec. 31-9-13 ..... Rig up.
Loring Oil Co.'s No. 1 Garner, 270 ft. N, 300 ft. E, SW cor. NW NE, Sec. 4-7-11 ..... Began drlg. Sept. 17; cmtd. 10-in. 106 ft; drlg. 1,440 ft.
Loring Oil Co.'s No. 1 Trammell, 250 ft. N, 250 ft. W, SE cor. SW NW, Sec. 4-7-11 ..... Cmtd. 6⅝-in. 2,276 ft.
Magnolia Pet. Co.'s No. 1 Glauque, 484 ft. N, 390 ft. E, SW cor. NW SW, Sec. 26-7-14 ..... D.S. test 2,780 ft; 28 fourbies S. W; small show gas, no oil; coring gummy shale 2,800 ft.
McDaniels & Lieber's No. 2 Batson, 480 ft. S, 220 ft. E, NW cor. SW SE, Sec. 16-8-12 ..... S.D. wtr. 2,080 ft.
C. D. Neff, trustee's No. 1 Turner, 1,170 ft. S, 180 ft. W, NE cor. NW, Sec. 4-7-11 ..... Drlg. 1,620 ft.
Paramount O. & G. Co.'s No. 1 Woolems, 330 ft. N, 330 ft. W, SE cor. NE NW, Sec. 11-6-12 ..... Drlg. 2,290 ft.
Pelican Nat. Gas Co.'s No. 4 La. Long Leaf Lbr. Co., 300 ft. S, 300 ft. E, NW cor. NW SW, Sec. 4-7-11 .... Arranging test; T.D. 2,557 ft.
Pelican Nat. Gas Co.'s No. 5 La. Long Leaf Lbr. Co., 200 ft. S, 200 ft. W, NE cor. NW SW, Sec. 4-7-11 .... Location.
Pelican Nat. Gas Co.'s No. 4 Sabine Lbr. Co., 330 ft. S, 330 ft. W, NE cor. NW NE, Sec. 11-7-12 ..... Drlg. 2,252 ft.
Philps et al's No. 1 Turner, 80 ft. N, 80 ft. W, SE cor. NW NW, Sec. 4-7-11 ..... Location.
D. H. Riddick's No. 1 Scretchfield, 400 ft. E, 400 ft. N, SW cor. NW SE, Sec. 18-9-12 ..... S.D. 3,280 ft.
H. T. Stacey et al's No. 1 Polly, NE cor. NE NE, Sec. 18-8-12 ..... Rig up.
The Texas Co.'s No. 1 Stille, 330 ft. N, 330 ft. W, SE cor. SW, Sec. 33-8-11 ..... Began drlg. Sept. 21; cmtd. 10-in. 1,500 ft.
Wilson & Son's No. 1 Ganby-Garrett, NW SW, Sec. 4-5-12 ..... Began drlg. Sept. 10; cmtd. 15½-in. 65 ft; 12½-in. 286 ft; drlg. 660 ft.

TENSAS PARISH

Stovall Drlg. Co.'s No. 1 Miller, NE SW, Sec. 18-10-10 .... Arranging to plug back to 700 ft. to test gas show; T.D. 1,560 ft.
Toteco Oil Co.'s No. 1 La. Long Leaf Lbr. Co., 325 ft. S, 100 ft. W, NE cor. NW, Sec. 18-6-12 ..... Reported junked and abd. 4,077 ft; C.O; to go deeper.
A. R. Willis et al's No. 1 Currey, 1,320 ft. S, 1,320 ft. E. NW cor., Sec. 39-11-12 ..... D.S. test 2,780 ft; S.W. and show gas; W.O; T.D. 2,780 ft.

WEBSTER PARISH

Coyle, trustee's No. 1 Fraser, 200 ft. N, 200 ft. E, SW cor. NE SE, Sec. 27-23-11 ..... Derrick.
J. P. Evans et al's No. 1 Crichton Co., NE cor. NW NE, Sec. 31-18-8 ..... Drlg. 2,223 ft.

WEST CARROLL PARISH

Ark.-La. P. L. Co.'s No. 1 Griffith, 660 ft. S, 660 ft. W. NE cor. NE NW, Sec. 17-22-10 ..... Rig up.

ARKANSAS

CHICOT COUNTY

H. R. Smith's No. 1 Lytle, 660 ft. N, 660 ft. E, C, Sec. 31-18-3 ..... Drlg. 1,986 ft.

CLAY COUNTY

S. C. Jeffries, trustee's No. 1 Underwood, 510 ft. N, 350 ft. W, C NW SE, Sec. 4-20-8 ..... Began drlg. Sept. 16; S.D. 100 ft.

CLEBURNE COUNTY

Cosden Oil Co. of Ark.'s No. 1 Donophan, 100 ft. S, 660 ft. E, NW cor. SW SE, Sec. 19-9-10 ..... Drlg. slate 4,220 ft.
Donnelly-Craver et al's No. 1 Donophan Lbr. Co., SE cor. NW, Sec. 33-11-9 ..... Drlg. shale 3,300 ft.

COLUMBIA COUNTY

S. Y. Dorfman et al's No. 1 Merritt, 923 ft. S, 160 ft. W, NE cor. SE NW, Sec. 25-19-22 ..... Top Arkadalphia 1,763 ft; top Nacatoch 1,861 ft; T.A. 2,803 ft.

FRANKLIN COUNTY

Red Bank Oil Co.'s No. 1 Edtin, SW cor., Sec. 33-10-26 .. Fishing tools 3,750 ft; cored.

GARLAND COUNTY

Givens et al's No. 1 Garrett, 660 ft. S, 660 ft. W, C, Sec. 1-8-19 ..... Waiting on bailing line; T.D 3,790 ft.

HOT SPRINGS COUNTY

Anisman et al's No. 1 Hinson est., NE NE, Sec. 19-4-16 ... Drlg. slate 1,100 ft.
J. R. Lockhart's No. 1 Cunningham, 285 ft. S, 285 ft. W, NE cor., Sec. 11-5-16 (reported in Grant County in error) ..... Derrick.

LINCOLN COUNTY

B. F. Thompson, trustee's No. 1 McGhee, 330 ft. S, 150 ft. W, C, Sec. 8-8-7 ..... Rigging up.

LITTLE RIVER COUNTY

A. L. Buck's No. 1 Greason, NW NW, Sec. 25-12-32 ..... S.D. 2,502 ft.

LOGAN COUNTY

J. H. Flowers' No. 1 J. H. White, Sec. 13-6-26 ..... U.R. 5 3/16-in. 3,570 ft. T.D. 3,610 ft.

MADISON COUNTY

J. W. Baxter's No. 2 Hallem, C, Sec. 17-16-26 ..... Location.

MILLER COUNTY

East Texas O. & G. Co.'s No. 1 Harvey, 500 ft. E, 300 ft. S, NW cor., Sec. 2-15-26 ..... Began drlg. Sept. 18; cmtd. 12-in. 102 ft.
E. & F. Oil Co.'s No. 1 E. L. Beck, 200 ft. S, 200 ft. E, NW cor. SW, Sec. 36-15-26 ..... Drlg. 2,550 ft.
Fitzwater et al's No. 1 Beck, 200 ft. N, 200 ft. W, SE cor. SW SE, Sec. 33-15-26 ..... Derrick.
Lentz et al's No. 2 Johnson, SE cor. NW, Sec. 24-15-16 .. Drlg. 2,700 ft.

OUACHITA COUNTY

Belmont et al's No. 1 Buck, SE cor. SE SW, Sec. 16-15-17 D.S. test 1,800-1,900 ft; dry; D.S. test 2,272 ft. dry; 2,390 ft., test 2,272 ft. dry; 2,390 ft. S. W; drlg. 2,525 ft.
Copenhaven et al's No. 1 Elliott, Sec. 11-15-17 ..... Rig up.
Graves Bros.' No. 1 Walker, 350 ft. N, 280 ft. E, SW cor., Sec. 9-14-18 ..... Top Nacatoch 1,352 ft; drlg. lime 1,578 ft.
A. B. Turner, trustee's No. 1 Dave Brown, 320 ft. N, 220 ft. E, SW cor., Sec. 23-15-18 ..... Drlg. 1,225 ft

PIKE COUNTY

E. R. Henderson's No. 1 Tilyou, 660 ft. W, 500 ft. S, NE cor. NE SE, Sec. 26-8-14 ..... Drlg. 900 ft.

POPE COUNTY

Ark.-La. P. L. Co.'s No. 2 McFaddin, 685 ft. N, 485 ft. W, SE cor. NE SW, Sec. 15-9-21 ..... Began drlg. Sept. 20; drlg. 210 ft
Cosden Oil Co.'s No. 1 Mo. Pac. R.R., 660 ft. N, 660 ft. E, SW cor. NW SE, Sec. 13-9-19 ..... Drlg. hard sand 4,564 ft.

SCOTT COUNTY

Arkansas Valley Gas Co.'s No. 1 Turner, C SE, Sec. 27-5-30 ..... Location.
Heavener O. & G. Co.'s No. 1 Riser, Sec. 36-4-26 ..... Straightening hole; T.D. 1,536 ft.

SEBASTIAN COUNTY

W. M. Greeson's No. 1 Spears, Sec. 9-7-29 ..... Tested S.W. 3,515 ft; W.O.
Lavaca O. & G. Co.'s No. 1 Moore, C NW SW, Sec. 27-8-30 ..... Cmtd. 8¼-in. 235 ft; drlg. 670 ft
Mansfield Gas Co.'s No. 14 Fee, Lot 10, Sec. 1-4-31 ..... S.G. 1,083 ft; drlg. hard sand 1,118 ft.
Ozark Nat. Gas Co.'s No. 10 Weaver, 660 ft. N, 660 ft. W, SE cor. SE NE, Sec. 27-8-30 ..... Straightening hole; T.D. 2,640 ft
Ozark Nat. Gas Co.'s No. 1 Bates, C SE NW, Sec. 28-8-30 S.G. 1,940-50 ft; cmtd. 6⅝-in. 2,144 ft.

UNION COUNTY

S. B. Hickman's No. 1 Hogg, 330 ft. S, 150 ft. E, NW cor. SE SE, Sec. 35-16-17 ..... Top Graves sand 2,351 ft; drlg 2,365 ft.
Marine Oil Co.'s No. 2-B Thompson, Sec. 10-18-13 ..... Location.
Marine Oil Co.'s No. 1-F Winn, Sec. 10-18-13 ..... D.S. test 3,545-60 ft; S.W; coring 3,584 ft.
Modisette Drlg. Co.'s No. 4 Union Sawmill, 330 ft. W, 300 ft. N, SE cor., Sec. 14-18-14 ..... Location.

VAN BUREN COUNTY

Glenn Kohle et al, trustee's No. 1 Scalan, 200 ft. S, 200 ft. W, NE cor. SE NW, Sec. 5-19-13 ..... S.D. 50 ft.

WASHINGTON COUNTY

Delbert & Graves' No. 1 Cunningham, Sec. 14-15-32 ..... S.D; W.O. 602 ft.
C. H. Willoughby's No. 1 Jones, Sec. 34-16-30 ..... S.D; W.O. 1,650 ft.
Lincoln Leaseholding Synd.'s No. 1 Lincoln, Sec. 30-15-32 U.R. 8-in. to T.D. 1,500 ft.
H. H. Taylor et al's No. 1 Runny, C NE SW, Sec. 1-13-29. Fishing 1,005 ft.

YELL COUNTY

Tegmeier & Luckett's No. 1 Falcon, Sec. 36-7-21 ..... Drlg. sand 5,400 ft.

EAST TEXAS

BOWIE COUNTY

Joe Burnham et al's No. 1 G. W. Burnett, 150 ft. W, 400 ft. S, NE cor. G. W. Burnett 76 ac., in W. H. Janes Sur. ..... Coring Nacatoch 955 ft.
Maud-Redwater Oil Co.'s No. 1 Merritt, Y. S. McKinney Sur. ..... Derrick.
Lee Timberlake's No. 1 Tidwell, 2,800 ft. N, 300 ft. W, SE cor., Jos. Eskell Sur. ..... Coring shale 2,820 ft; D.S. test 2,695-2,730 ft; 21 fourbies S.W; S.D. 3,008 ft.

CAMP COUNTY

McDonald Bros.' No. 1 Tillery, 150 ft. E, 450 ft. S, NW cor. 127-ac. tr., in J. H. Murphy Sur. ..... Location.

CASS COUNTY

Phillips Pet. Co.'s No. 1 J. R. Olds, 300 ft. N, 170 ft. E, SW cor., J. A. Stephenson Sur. ..... Rig up.
John C. Rogers' No. 1 I. E. Lanier, 573 ft. N, 879 ft. W, SE cor. Lanier 86 acres in K. E. Welborn Sur. ..... Coring sand shale 1,010 ft.

MARION COUNTY

W. D. Chew's No. 1 Fee, 2,350 ft. W, 1,275 ft. N, SE cor., W. J. Hamilton Sur. ..... D.S. test 3,532 ft; dry; drlg 3,610 ft.
P. E. Hussey's No. 1 A. A. Trammell, Chas. Lockhart Sur. ..... S.D. wtr. 1,334 ft.

RED RIVER COUNTY

D. M. Buffington's No. 1 Hossler, E. Hughhart Sur. ..... S.D. 2,865 ft.
Johnson Pet. Co.'s No. 2 Randolph, Edw. Dean Sur. ..... Swedging; 2 jts. collapsed 8-in; arranging to cement 6⅝-in. and packer 2,182 ft.

SABINE COUNTY

Benedum & Trees Oil Co.'s No. 1 Nona Mills Lbr. Co., Jas. Mason Sur. ..... Drlg. chalky lime 3,348 ft

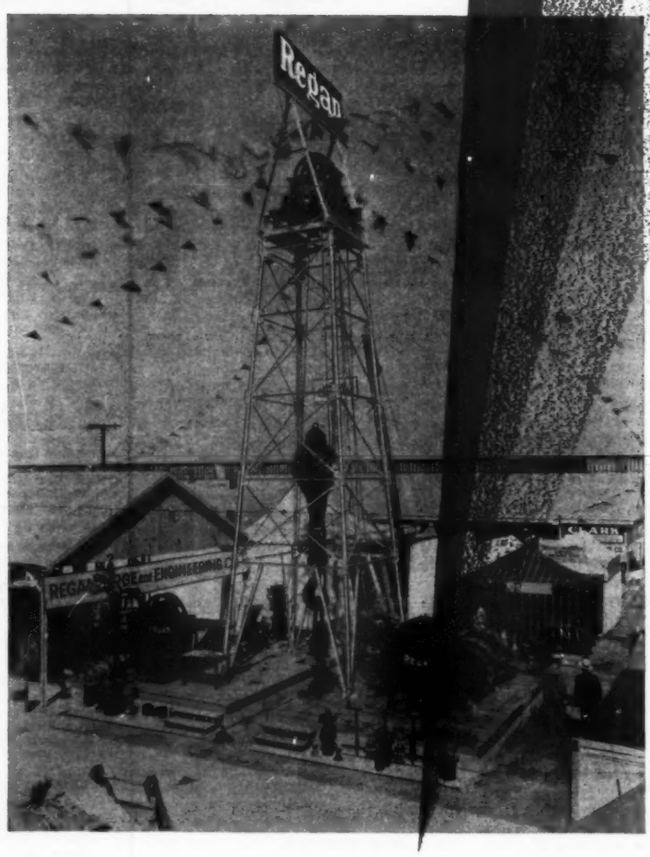
SHELBY COUNTY

Chapperall Oil Co.'s No. 2 Holt, Matthew Moore Sur. ..... Coring hard lime 6,350 ft.
G. R. Ridgeway's No. 1 G. D. Parker, 4,980 ft. E, 750 ft. N, SW cor., Jessie McKelvey Sur. ..... Derrick.

ALCORN COUNTY

Alcorn Pet. Co.'s No. 1 Matthews, SE cor., Sec. 14-2s-7e Fishing 6-in. and tools 2,392 ft; T.D. 2,735 ft.

meet Regan at Tulsa



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NEW 1931 CATALOGS READY FOR DISTRIBUTION

ATTALA COUNTY

K. A. March's No. 1 H. A. Moore, 900 ft. W, 330 ft. S, NE cor. SE NW, Sec. 2-15-5e ..... Location.

CLAY COUNTY

Ohio Oil Co.'s No. 1 Cantrell, NE cor., Sec. 16-15-5 .... Cmtd. 18⅝-in. 80 ft.

CHICKASAW COUNTY

Hightower & Golson's No. 1 Flemming, NE cor., Sec. 20-13-3 ..... Rigging up cable tools; T.D. 1,495 ft. in Paleozoic rock.

HINDS COUNTY

Big Block Oil Co.'s No. 1 Southern Christian Institute, C N½ NE, Sec. 30-6-4 ..... S.D. 1,910 ft.

Hawkeye Gas Co.'s No. 1 Webster, NW cor. NE NW, Sec. 15-5-1e ..... Began drlg. Sept. 24.

Jackson Oil Co.'s No. 1 Central Cotton Oil Co., NW cor. SW NW, Sec. 3-5-1e ..... Rig up.

Jackson O. & G. Co.'s No. 1 Capital Land & Inv. Co., Sec. 29-6-1e ..... Drlg. 2,179 ft.

Dr. Barney Kennedy's No. 1 Fee, 150 ft. E, 200 ft. N, SW cor. NE NE, Sec. 34-6-1e ..... Location.

Lefleur O. & G. Co.'s No. 1 Chadwick-Brown, 550 ft. S, 780 ft. W, NE cor. SW NW, Sec. 11-5-1e ..... Cmtd. 10-in. 700 ft.

Cleve Love et al's No. 1 Ridgeway-McGee, 100 ft. W, 500 ft. S, C, Sec. 2-5-1e ..... D.S. test 2,488 ft; S.W; arranging to deepen.

Love Pet. Co.'s No. 1 Maley, SE cor. NW, Sec. 15-5-1e.... Cmtd. 15½-in. 40 ft; 10-in. 718 ft; drlg. 950 ft.

Love Pet. Co.'s No. 1 Morton, Lbr. Co., 100 ft. W, 200 ft. N, SE cor. SW SW, Sec. 34-6-1e ..... Derrick.

Miss. Pet. Co.'s No. 1 Baptist Orphanage, 175 ft. E, 130 ft. N, SW cor. SE SE, Sec. 28-6-1e ..... Cmtd. 10-in. 240 ft.

Miss. Pet. Co.'s No. 1 Solvent Investment Co., NE cor. NE SW SW, Sec. 14-5-1w ..... Drlg. 1,850 ft.

Miss.-Tex. Oil Co.'s No. 1 Negro Fair Assn., SW cor. NW SE, Sec. 28-6-1e ..... S.D. 1,902 ft; title work.

Mrs. Reeder et al's No. 1 State, SE cor. NW NW, Sec. 25-6-1e ..... W.O; T.D. 2,905 ft.

Tri-State O. & G. Co.'s No. 1 Wilson, SW cor. SE NE, Sec. 23-6-1e ..... Derrick.

J. A. Weir et al's No. 1 Holliday & Ross, NW SE, Sec. 8-6-2e ..... S.D; W.O. 2,653 ft.

Universal Gas Co.'s No. 1 Sharbrough, SW cor. SE, Sec. 28-6-1e ..... Began drlg. July 29; S.D; W.O. 88 ft.

HUMPHRIES COUNTY

E. S. Steele et al's No. 1 C. B. Box, SE cor. SE NE, Sec. 25-14-4w ..... Set 12½-in. 60 ft; S.D.

LAUDERDALE COUNTY

Lauderdale O. & G. Co.'s No. 1 Lackey, 990 ft. S and E, NW cor. NE, Sec. 2-7-16 ..... Tested S.W. 3,252 ft; S.D. 3,420 ft.

Meridian O. & G. Co.'s No. 1 Hauser, Sec. 33-8-18 ..... Drlg. sandy shale 2,826 ft.

J. R. Smith Oil Co.'s No. 1 C. F. Craig, Sec. 2-16-14 ..... Derrick.

LAFAYETTE COUNTY

Banks-Goode et al's No. 1 May, 113½ rds. S, 26 rds. E, NW cor. SW, Sec. 22-10-1w ..... Derrick.

LINCOLN COUNTY

Lincoln O. & G. Co.'s No. 1 Pat Case, NE cor. NE, Sec. 21-3-6 ..... S.D; W.O. 2,231 ft.

MADISON COUNTY

Barney Kennedy et al's No. 1 Raymond, 300 ft. E, 1,800 ft. N, SW cor., Sec. 32-7-2e ..... Cmtd. 12½-in. 706 ft.

MONROE COUNTY

Amory Dev. Co.'s No. 1 Bourland, Sec. 2-13-19 ..... S.D. 2,912 ft; bailer lost in hole.

Amory Pet. Co.'s No. 1 Hall, Sec. 8-13-19 ..... Shot 2,402-18 ft; small S.O; arranging to shoot 2,387-95 ft.

Associated Oil Co.'s No. 1 School, SW cor. SW SE, Sec. 16-15-17 ..... Began drlg. Aug. 26; S.D. 32 ft.

Park Bowser et al's No. 1 Cowart, second hole, Sec. 2-12-19 ..... S.D. 30 ft.

RANKIN COUNTY

Millstein O. & G. Corp.'s No. 1 Hartfield, 1,000 ft. W, 62 ft. N, SE cor. NE, Sec. 12-5-1e ..... Drlg. 2,000 ft.

R. A. Moore et al's No. 1 Interior Lbr. Co., Sec. 28-6-1e... S.D. 900 ft.

Love Pet. Co.'s No. 1 Moore (was Interior Oil Co.'s), 660 ft. N, 660 ft. W, SE cor. NW NW, Sec. 28-6-2e.. S.D. 900 ft.

Dr. S. D. Raymond's No. 1 Graves, 1,810 ft. N, 3,210 ft. W. SE cor., Sec. 12-5-1e ..... Derrick.

Southern Pet. Co.'s No. 1 Investment, 2,170 ft. N, 1,790 ft. W, SE cor., Sec. 12-5-1e ..... Drlg. sand 1,320 ft.

WARREN COUNTY

El Dorado Oil Co.'s No. 1 Dornbush, Sec. 8-18-15 ..... S.D. 2,475 ft; 2,850 ft. D.S. in hole; W.O.

WINSTON COUNTY

Miss. Drlg. Co.'s No. 1 Scarbrough, NW cor., Sec. 15-13-14 Rig up.

YALOBUSHA COUNTY

Carter Oil Co. and J. W. Collett's No. 1 Blackmur, 330 ft. S, 990 ft. W, Sec. 14-11-4 ..... Reaming to set csg. at 2,424 ft; T.D. 2,436 ft.

YAZOO COUNTY

Amerada Pet. Corp.'s No. 1 Doherty, SW SW, Sec. 24-12-2. Drlg. sandy lime 5,133 ft.

ALABAMA

LAMAR COUNTY

Griggs & Knapp's No. 1 Wefel, Sec. 25-12-14 ..... T.A. 1,740 ft.

LAUDERDALE COUNTY

A. D. Morton et al's No. 10 O'Neal est., Sec. 8-2s-13w.... Cmtd. 12½-in. 125 ft; drlg. hard lime 905 ft.

MARION COUNTY

Hobson et al's No. 1 John Clark, SE. Sec. 29-1°-14 ... Derrick pattern.

WASHINGTON COUNTY

S. A. Hobson's No. 1 Hobson Bros., Sec. 9-8-2 ..... S.D; W.O; flow at 1,450 ft.

S. A. Hobson's No. 1 Wilson, Sec. 27-7-1 ..... Fishing bailer; T.D. 881 ft.

Oscar Brown's No. 2 Land & Cotton Co., Sec. 25-3-2w.... Drlg. 700 ft.

GULF COAST FIELDS AND WILDCATS

(Continued from Page 104)

Sun Oil Co.'s No. 12 Wilburn fee, east ..... Rig.

Sun Oil Co.'s No. 1 Zadie Fisher, southwest ..... Drlg. water sand 5,067 ft.

The Texas Company's No. 1 Williams, southwest ..... Drlg. hard lime 5,483 ft.

The Texas Company's No. 1 Winfree, west ..... Drlg. hard lime and sand 3,445 ft.

Yount Lee Oil Co.'s No. 1 Fisher (workover) ..... Drlg. oil sand 6,620 ft.

Yount Lee Oil Co.'s No. 1 Hindman, southwest ..... Coring sand 5,893 ft.

Yount Lee Oil Co.'s No. 16 Chambers, south ..... Drlg. sand and boulders 1,345 ft.

Yount Lee Oil Co.'s No. 3 Fisher, southeast ..... Drlg. sand 6,261 ft.

Yount Lee Oil Co.'s No. 5 Phillips, southwest ..... Drlg. oil sand 5,016 ft.

Yount Lee Oil Co.'s No. 9 Woodward, southeast ..... Drlg. shale and lime 4,463 ft.

RACCOON BEND—AUSTIN COUNTY

Humble & Valley's No. 2 Duncan-State ..... Cmtd. 15½-in. csg. 84 ft.

Humble & Valley's No. 1 Fritz Lamp ..... Drlg. sand 4,871 ft.

Humble & Valley's No. 3 Diemar ..... Drlg. sandy shale 3,340 ft.

Humble & Valley's No. 3-B Hardy ..... Derrick.

Humble & Valley's No. 9 Mueller ..... Derrick.

Humble & Valley's No. 7 Payne ..... Derrick.

Humble & Valley's No. 8 Payne ..... Derrick.

Humble & Valley's No. 10 Payne ..... Swabbing 3,438 ft.

Humble & Valley's No. 6 Saunders ..... Derrick.

Humble & Valley's No. 3 Sherrod ..... Building derrick.

Humble & Valley's No. 9 Thompson ..... Waiting cement to set 3,206 ft.

Humble & Valley's No. 11 Thompson ..... Building derrick.

Humble & Valley's No. 4 Wilson ..... Drlg. shale and boulders 322 ft.

Humble & Valley's No. 6 Woodley ..... Derrick.

Humble & Valley's No. 7 Woodley ..... Derrick.

Humble & Valley's No. 8 Woodley ..... Derrick.

Humble & Valley's No. 9 Woodley ..... Derrick.

Humble & Valley's No. 10 Woodley ..... Location.

Humble Oil & Ref. Co.'s No. 1 Hugo-Hagen ..... Drlg. shale 4,102 ft.

HUMBLE—HARRIS COUNTY

Cullen West's No. 5 Lee, south ..... Rig.

Cullen West's No. 2 Burt ..... Working over.

Houtex Production Co.'s No. 1 Burgess ..... No report.

Lakue trustee's No. 1 Crane, northwest ..... Derrick.

M. LaRue trustee's No. 1 Tuffly, northwest ..... Location.

Rio Bravo Oil Co.'s No. 7 fee, west ..... Flowing by heads 90 bbls. 4,126 ft.

Sun Oil Co.'s No. 14 Bender, west ..... Swabbing 4,743 ft.

Sun Oil Co.'s No. 15 Bender ..... Drlg. shale 3,961 ft.

Sun Oil Co.'s No. 16 Bender ..... Derrick.

Sun Oil Co.'s No. 17 Bender ..... Drlg. shale and lime 4,162 ft.

Sun Oil Co.'s No. 18 Bender ..... Derrick.

Sun Oil Co.'s No. 49 River, north ..... Drlg. gumbo and lime 4,237 ft.

The Texas Company's No. 2 Atlantic & Gulf, east ..... Heaving shale 5,068 ft.

The Texas Company's No. 3 fee ..... Total depth 4,397 ft.; cmtd. csg.

The Texas Company's No. 25 House, northeast ..... Drlg. sticky shale 4,071 ft.

The Texas Company's No. 43 Stevenson, east ..... Rig.

West Production Co.'s No. 3 Foster, north ..... Failed to flow 4,338 ft.; pulling tubing.

E. M. Wilson's No. 5 Pickins ..... Drlg. shale 1,440 ft.

PIERCE JUNCTION—HARRIS COUNTY

Gulf Production Co.'s No. 2 Manchester Corp. ..... pudded.

Mike Kowin's No. 1 Jones fee, northwest ..... Drlg. gumbo 976 ft.

Navarro Oil Co. and Texas Exploration Co.'s No. 20 Dooley ..... Drlg. gumbo 1,200 ft.

Rio Bravo Oil Co.'s No. 14-A Settegast ..... Shut down 5,045 ft.

Rio Bravo Oil Co.'s No. 20-A Settegast ..... Tested salt water; pulling screen.

Saxet Oil Co.'s No. 8 Herman estate ..... Comp. flowing 1,000 bbls. fluid 70 per cent salt water 4,594 ft.

Elvin Tilton's No. 1 G. P. Co.-Jones fee ..... Oil sand 3,769-90 ft.; cem. 6⅝-in. casing 3,760 ft.

Warner-Quinlan's No. 1 Minchen ..... Drlg. lime 3,930 ft.

BIG CREEK—FORT BEND COUNTY

Gulf Production Co.'s No. 60 Davis ..... Drlg. sticky shale 2,666 ft.

Navarro Oil Co.'s No. 5 Davis ..... Total depth 3,192 ft.; sidetracking [illegible] ft.

LOST LAKE—CHAMBERS COUNTY

Pure Oil Co.'s No. 5 Lost Lake ..... hing stuck drill stem 5,158 ft.

NASH—BRAZORIA COUNTY

Rycade Oil Corp.'s No. 27 Wisdom ..... Drlg. sandy lime 5,262 ft.

SARATOGA—HARDIN COUNTY

Rio Bravo Oil Co.'s No. 91-A Cotton ..... Comp. flowing 100 bbls. 509 ft.

GOOSE CREEK—HARRIS COUNTY

Humble Oil & Ref. Co.'s No. 78 Simms-Smith ..... Total depth 4,973 ft.; cmtd. 13⅜-in. csg. 4,872 ft.

SPINDLETOP—JEFFERSON COUNTY

Unity Oil Co.'s No. 101 McFaddin ..... o report.

Yount Lee Oil Co.'s No. 17 McFaddin (workover) ..... No report.

Yount Lee Oil Co.'s No. 141 McFaddin ..... Comp. flowing 225 bbls. 3,754 ft.

NORTH DAYTON—LIBERTY COUNTY

Saxet Oil Co.'s No. 2 Davis ..... Rig.

Saxet Oil Co.'s No. 3 Wilhite ..... Drlg. sand and shale 5,475 ft.

Harrison Oil Co.'s No. 1 Gulf fee ..... Total depth 4,952 ft.; sidetracking 1,700 ft.

Harrison Oil Co.'s No. 1 Jones ..... Location.

HIGH ISLAND—GALVESTON COUNTY

Gulf Production Co.'s No. 10 Smith ..... Sticky shale 5,023 ft.; drill stem stuck.

Marrs McLean's No. 18 Cade ..... Abandoned 4,177 ft.

Marrs McLean's No. 19 Cade ..... Rig.

ORCHARD—FORT BEND COUNTY

Gulf Production Co.'s No. 25 Moore ..... Drlg. sandy shale 3,382 ft.

Gulf Production Co.'s No. 26 Moore ..... Drlg. rock 2,680 ft.

HULL—LIBERTY COUNTY

The Texas Company's No. 3 Barrow ..... Drlg. gumbo 2,101 ft.

PORT NECHES—ORANGE COUNTY

Gulf Production Co.'s No. 1 W. H. Starks ..... Trying to set screen 6,063 ft.

The Texas Company's No. 2 Starks ..... Drlg. sand and shale 5,342 ft.

CLAY CREEK—WASHINGTON COUNTY

Sun Oil Co.'s No. 4 Janner ..... Total depth 2,677 ft.; reaming.

Sun Oil Co.'s No. 4 Witt ..... Drlg. sand 1,020 ft.

SOUR LAKE—HARDIN COUNTY

The Texas Company's No. 307 fee ..... Coring sand 1,998 ft.

ESPERSON—LIBERTY COUNTY

Cranfill-Reynolds Oil Co.'s No. 13 Esperson ..... Pulling screen to deepen 3,288 ft.

Cranfill-Reynolds Oil Co.'s No. 17 Esperson ..... Drlg. sand and shale 1,185 ft.

Cranfill-Reynolds Oil Co.'s No. 5 Moores Bluff ..... Oil sand 2,270 ft.

Cranfill-Reynolds Oil Co.'s No. 1 Vaydak (workover) .... Standing 7,386 ft.

Yount Lee Oil Co.'s No. 3 Moores Bluff ..... Total depth 7,592 ft.; drlg. hard shale 7,128 ft.

HANKAMER—LIBERTY COUNTY

Gulf Production Co.'s No. 1 Ezzell ..... Total depth 4,425 ft.; sidetracking 1,746 ft.

Gulf Production Co.'s No. 9 Boyt ..... Drlg. gumbo 1,200 ft.

WEST COLUMBIA—BRAZORIA COUNTY

The Texas Company's No. 80 Hogg (workover) ..... Pulling liner 2,770 ft.

DE WALT—FORT BEND COUNTY

Humble Oil & Ref. Co.'s No. 11 Nelson ..... Rig.

BOLING—WHARTON COUNTY

C.S. Thomas' No. 1 Volney ..... Shut down 235 ft.

C. S. Thomas' No. 1 Taylor ..... Temporarily abandoned 1,587 ft.

REFUGIO—REFUGIO COUNTY

Drookins et al's No. 1 Kay ..... Location.

Houston Oil Co.'s No. 1 Rooke ..... Drlg. sticky shale 4,154 ft.

Houston Oil Co.'s No. 1 City, Blk. 59 ..... Waiting cement to set 6,455 ft.

Houston Oil Co.'s No. 1 O'Connor ..... Standing 5,862 ft.

Houston Oil Co.'s No. 1 Rose Lambert ..... Total depth 5,922 ft.; plugged to 5,000 ft.

Independent Oil & Gas Co.'s No. 1 Rose Lambert ..... Drlg. sandy shale 5,640 ft.

Independent Oil & Gas Co.'s No. 6 Jerry Reilly (workover) ..... Drlg. sand and shale 7,160 ft.

Edwin M. Jones' No. 8-A J. F. B. Heard ..... Temporarily abandoned.

Larco Oil Co.'s No. 6 Strauch ..... Set 6⅝-in. csg. 3,680 ft.

Luling Oil & Gas Co.'s No. 1 Talman, Blk. 104 ..... Drlg. shale 3,125 ft.

Luling Oil & Gas Co.'s No. 1 J. W. Kay ..... Fishing drill pipe 4,928 ft.

Luling Oil & Gas Co.'s No. 1 West ..... Killed gas blowout; waiting cmt. to set.

Mission Drilling Co.'s No. 1 Ben Shelton ..... Drlg. sandy shale 5,405 ft.

Mission Drilling Co.'s No. 1 Moss-Heard, Blk. 11 ..... Drlg. sandy shale 6,427 ft.

Mission Drilling Co.'s No. 1 O'Brien (workover) ..... Standing 5,471 ft.

Moody-Seagraves Prod. Co.'s No. 1 Linney, Blk. 41..... Rig.

Moody-Seagraves Prod. Co.'s No. 1 Linney, Blk. 42..... Drlg. sand and lime 2,349 ft.

Moody-Seagraves Prod. Co.'s No. 3 O'Brien ..... Temporarily abandoned.

Moody-Seagraves Prod. Co.'s No. 1-A St. John ..... Drlg. sticky shale 5,410 ft.

Moody-Seagraves Prod. Co.'s No. 1 Strauch, Blk. 65 ..... Drlg. gumbo and lime 4,670 ft.

Moody-Seagraves Prod. Co.'s No. 5 Morgan-O'Connor .... Set surface csg. 1,580 ft.

Moody-Seagraves Prod. Co.'s No. 6 Morgan-O'Connor .... Location.

Ed Price's No. 2 Mission River ..... Drlg. sandy shale 3,602 ft.

Pearson Properties, Inc.'s No. 1 Hornburg ..... Derrick.

Pittsburg Refugio Oil Co.'s No. 2 Terrell ..... No report.

Saxet Oil Co.'s No. 1 L. H. Johnson, Blk. 11 ..... Location.

Saxet Oil Co.'s No. 1 Fox heirs (workover) ..... Fishing 3,693 ft.

Saxet Oil Co.'s No. 3 Ryals ..... Killed blowout 5,671 ft.

L. L. Smith's No. 1 Powers, Blk. 85 ..... Drlg. gumbo 1,200 ft.

L. L. Smith's No. 1 Rodgers ..... Derrick.

Union Producing Co.'s No. 10 Fannie Heard ..... Total depth 3,665 ft.; cmtd. csg. 3,645 ft.

Union Producing Co.'s No. 6 O'Brien ..... Derrick.

Union Producing Co.'s No. 5 Powers ..... Rig.

Union Producing Co.'s No. 5 Mitchell ..... Rig.

SOUTH LOUISIANA FIELDS

LOCKPORT—CALCASIEU PARISH

Union Sulphur Co.'s No. 2 Moss ..... Standing 5,055 ft.

Union Sulphur Co.'s No. 1 Martha Moss ..... Drlg. rock 6,289 ft.

Vacuum Oil Co. and Gulf Ref. Co.'s No. 28 Miller ..... Trying to set screen 5,960 ft.

Vacuum Oil Co. and Gulf Ref. Co.'s No. 29 Miller ..... Oil sand 3,782 ft.; cmtd. csg.

Vacuum Oil Co.'s No. 30 Miller ..... Derrick.

Vacuum Oil Co.'s No. 31 Miller ..... Location.

Vacuum Oil Co.'s No. 6 Bayou State ..... Testing oil sand 3,775 ft.

Yount Lee Oil Co.'s No. 1 Miller ..... Drlg. shale and lime 7,104 ft.

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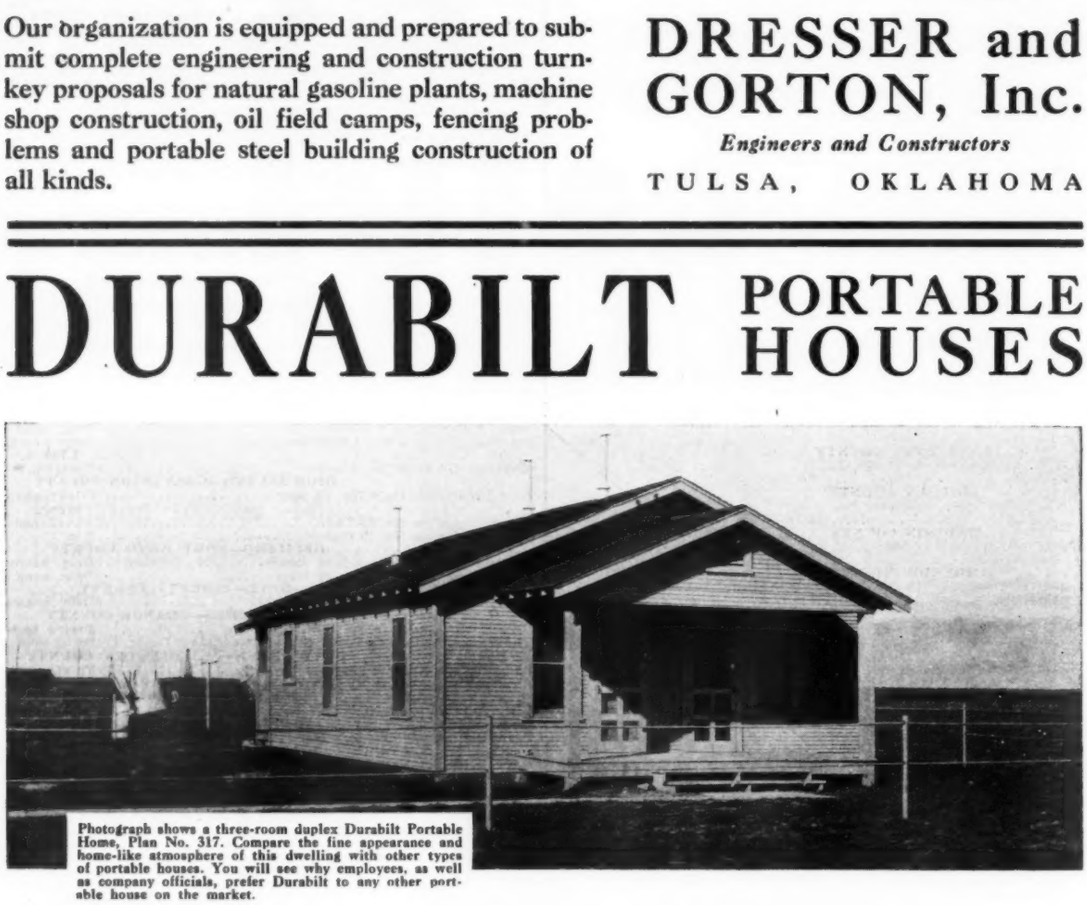

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HACKBERRY—CAMERON PARISH

Calcasieu Oil Co.'s No. 6 Caldwell ..... No report.
Federal Petroleum Co.'s No. 1 Hebert ..... Junked and abandoned 7,834 ft.
The Texas Company's No. 7 State ..... Drlg. shale and sand 4,654 ft.
Yount Lee Oil Co.'s No. 30 State ..... No report.
Yount Lee Oil Co.'s No. 2 Portia ..... No report.

JENNINGS—ACADIA PARISH

Heywood & Heywood's No. 1 Synd.cate ..... Comp. flowing 250 bbls. 1,974 ft.
Yount Lee Oil Co.'s No. 9 Hounierre Latrielle ..... Coring sandy shale showing oil 7,200 ft.
Yount Lee Oil Co.'s No. 7 Crowley ..... Drlg. 5,100 ft.

VINTON—CALCASIEU PARISH

Emerson-Moore's No. 1 Gray (workover) ..... No report.
Gorbat Oil Co.'s No. 1 Clement Lyons ..... Rig.
Gulf Refining Co.'s No. 4 Gardner ..... Oil sand 3,630 ft.; cmtd. csg.
Lucky Ten Oil Co.'s No. 1 Lizzo ..... No report.

BAYOU BOUILLON—ST. MARTIN PARISH

Rycade Oil Corp.'s No. 10 Bouillon (workover) ..... Pulling screen to deepen.
Rycade Oil Corp.'s No. 1 Woodyard Lake ..... Drlg. sandy shale 5,923 ft.
Rycade Oil Corp.'s No. 4 State ..... Total depth 1,166 ft.; cmtd. 13⅜-in. csg.

STARKS—CALCASIEU PARISH

Adams Oil Co.'s No. 1 Roderick ..... No report.
I. O. Davis' No. 1 Industrial ..... No report.
Gulf Refining Co.'s No. 25 Lutcher-Moore ..... Drlg. 1,156 ft.

SWEET LAKE—CAMERON PARISH

Magnolia Petroleum Co.'s No. 1 Sweet Lake ..... Drlg. 7,112 ft.

MISCELLANEOUS WILDCATS

TEXAS

AUSTIN COUNTY

Empire Gas & Fuel Co.'s No. 1 Kuntze, San Felipe ..... Rig.
O'Hara et al's No. 1 Schrader ..... Shut down for fuel 1,794 ft.

BRAZORIA COUNTY

The Texas Company's No. 1 Ewin, Harvey Little Sur. ... Total depth 7,140 ft.; cmtd. 6⅝-in. csg.
The Texas Company's No. 1 J. H. Murdock, Fresno ..... Drlg. gumbo 2,374 ft.
Mills Bennett Prod. Co.'s No. 1 Random, Allen ..... Total depth 5,363 ft.; fishing drill pipe.
Mills Bennett Prod. Co.'s No. 1 Poole, Allen ..... Oil sand 4,348-74 ft.; cmtd. 9⅝-in. csg. 4,305 ft.
Mills Bennett Prod. Co.'s No. 2 Allen ..... Drlg. shale and lime 3,894 ft.
Faust et al's No. 5 Faust ..... Drlg. hard lime 5,175 ft.
Freeport Sulphur Co.'s No. 2,001 fee, Bryan Heights .... Drlg. shale and lime 4,056 ft.
Layne et al's No. 7-A Wisdom, Damon Mound ..... Derrick.
Layne et al's No. 7 Wisdom, Damond Mound ..... Cavity 515 ft.; standing.
Rycade Oil Corp.'s No. 1 Seaburn, Stratton Ridge ..... Abandoned in salt 2,750 ft.
Rycade Oil Corp.'s No. 2 Seaburn, Stratton Ridge ..... Derrick.
Shell Petroleum Corp.'s No. 1 Haury-Danbury ..... Abandoned 1,604 ft.
Steel & Strickland's No. 1 Lockridge ..... Spudded and shut down.
United Oil Syndicate's No. 1 Moores, Francis Moore Sur.. Shut down 1,462 ft.

CALHOUN COUNTY

The Texas Company's No. 1 Thomas, J. P. Tilley Sur. .... Drlg. sand 5,448 ft.

CHAMBERS COUNTY

Chicago Oil Corp.'s No. 1 Lawrence ..... Total depth 3,948 ft.; cmtd. csg.
Shell Petroleum Corp.'s No. 2 Herff, Moss Bluff ..... Total depth 2,216 ft. in gumbo and lime; set 13⅜-in. csg.
Pure Oil Co.'s No. 1 J. H. K. Ranch, Oyster Bayou ..... Drlg. tough gumbo and lime 5,928 ft.

GRIMES COUNTY

Deering et al's No. 1 Munker, Darius Gregg Sur. ..... Drlg. sand 2,261 ft.
Deering & Noble's No. 1 Templeton, 6 miles south of Navasota ..... Waiting water 3,010 ft.

HARDIN COUNTY

D. O. Speights' No. 1 fee, near Batson ..... Drlg. sand 2,857 ft.

HARRIS COUNTY

Baldwin and associates' No. 1 Kitzman, Cypress ..... Shut down 4,247 ft.
Gulf States Oil Co.'s No. 1 Ansperger ..... Drlg. shale 1,854 ft.
Humble Oil & Ref. Co.'s No. 8 Warren, Hockley ..... Drlg. sandy shale 4,959 ft.
Humble Oil & Ref. Co.'s No. 5 Minnetex, Mykawa ..... Oil sand 4,826-73 ft.; swabbing.
Lone Star Oil Co.'s No. 1 McDade, N. Brady Sur. ..... Rig.
W. C. Turnbow et al's No. 1 Miller, Arthur McCormick Sur. ..... Rig.

JACKSON COUNTY

Jackson County Oil Syndicate's No. 8 Drushell, Edna .... Gas sand 3,866-70 ft.; waiting csg.
Jackson County Oil Syndicate's No. 2 Lee ..... Shut down 3,489 ft.
Warner-Quinlan's No. 1 Hungerford, Henry Smith Sur.... Location.

JEFFERSON COUNTY

Deep Test Oil Co.'s No. 1 McFaddin, Chaisson Sur. ..... No report.
The Texas Company's No. 4 Pipkin, Big Hill ..... Gumbo 1,420 ft.; cmtd. 13⅜-in csg.
Westbury Oil Co.'s No. 1 West, Choate Sur. ..... No report.

LIBERTY COUNTY

Gulf Production Co.'s No. 2 McFaddin, Moss Bluff ..... Drlg. sticky shale 5,382 ft.
Hamm et al's No. 1 Harvard, Davis Hill ..... Location.
Humble Oil & Ref. Co.'s No. 1 Breeding, Moss Bluff .... Cmtd. surface csg. 1,180 ft.
Humble Oil & Ref. Co.'s No. 1 Orlando Hylton, Moss Bluff ..... Drlg. shale and lime 4,736 ft.
Humble Oil & Ref. Co.'s No. 1 Sergent, Moss Bluff ..... Cmtd. surface csg. 1,148 ft.
Rycade Oil Corp.'s No. 1 Heiskell ..... Coring sandy shale and shell 2,846 ft.
Tucker et al's No. 1 Bell, Devers ..... Derrick.

MATAGORDA COUNTY

H. C. Cockburn's No. 2 Hawkins, Shepherds Mott ..... Drlg. gumbo 1,260 ft.
Empire Gas & Fuel Co.'s No. 1 Boker, Citrus Grove .... Drlg. sandy shale and lime 5,049 ft.

MONTGOMERY COUNTY

Lake Creek Oil Co.'s No. 1 Hunt, south of Conroe ..... Derrick.
Price & Whitehead's No. 2 Guerges ..... Shut down 2,956 ft.

NACOGDOCHES COUNTY

E. L. Burke et al's No. 1 Latimer, Jose De Los Santos Sur ..... Drlg. chalk 2,974 ft.

REFUGIO COUNTY

Blanco Oil Co.'s No. 1 Dorman ..... Shut down 3,120 ft.

SAN JACINTO COUNTY

E. P. Edwards et al's No. 1 Bennett, northwest of Cold Springs ..... Location.

VICTORIA COUNTY

Houston Oil Co.'s No. 1 McFaddin, C. O. Edwards Sur.... Drlg. gumbo 3,720 ft.
The Texas Company's No. 1 McFaddin, H. Bonny Sur. ... Drlg. sticky shale and lime 4,888 ft.
Lion Oil & Ref. Co.'s No. 2 McFaddin, M. Traviers Sur.... Drlg. water sand 5,755 ft.
Newton et al's No. 1 West ..... Shut down 1,550 ft.

WHARTON COUNTY

H. H. Given's No. 1 Hudgins, near Hungerford ..... Spudded.

WALLER COUNTY

W. P. Morris' No. 1 Chapman, Donoho Sur. ..... Abandoned 3,512 ft.

SOUTH LOUISIANA

CAMERON PARISH

Shell Petroleum Corp.'s No. 15 Watkins, Black Bayou ... Sandy shale and lime 3,686 ft.
Shell Petroleum Corp.'s No. 1 State, Black Bayou ..... Sandy shale showing oil 5,141 ft.; cmtd. csg.
Vacuum Oil Co.'s No. 1 Cameron Meadows, Sec. 21-14s-13w ..... Drlg. 5,211 ft.
The Texas Company's No. 6 State, Calcasieu Lake ..... Drlg. gumbo 1,186 ft.

IBERIA PARISH

Jefferson Oil Co.'s No. 9 Lake Peigneur, Jefferson Island.. No report.

IBERVILLE PARISH

Shell Petroleum Corp.'s No. 5 Wilbert, White Castle ..... Drlg. gray sand 5,004 ft.
Standard Oil Co.'s No. 7 Wilbert ..... Derrick.
Standard Oil Co.'s No. 8 Wilbert ..... No report.
Standard Oil Co.'s No. 1 E. B. and S. P. Schwing, Bayou Blue ..... Drlg.
Standard Oil Co.'s No. 1 Baist Cooperage, Bayou Blue ... Rig.

JEFFERSON PARISH

Humble Oil & Ref. Co.'s No. 1 Delaware, Sec. 2-16s-23e.. Drlg. sticky shale 4,950 ft.

JEFFERSON DAVIS PARISH

Shell Petroleum Corp.'s No. 1 Heyd, Iowa ..... Location.
Vacuum Oil Co.'s No. 1-A DeVilbiss, Roanoke ..... Drlg. sandy shale 4,542 ft.

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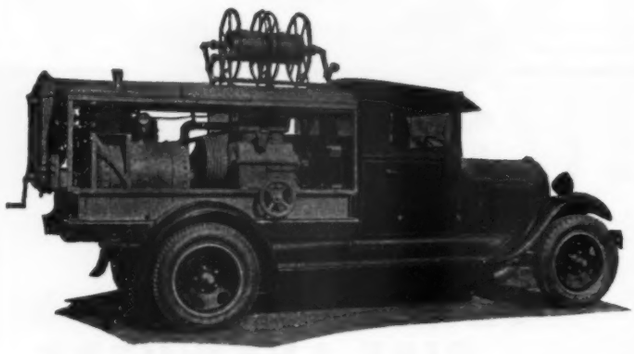

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LA FOURCHE PARISH

The Texas Company's No. 1 L.L.&E., Leesville ..... Total depth 3,443 ft.; drlg. sandy shale 4,866 ft.
Texas Gulf Sulphur Co.'s No. 1 Wilbert ..... Abandoned 1,821 ft.

PLAQUEMINE PARISH

Gulf Refining Co.'s No. 1 Buras Levee Board ..... Rig.
Humble Oil & Ref. Co.'s No. 2 Cockrell-Moran, Lake Grand Ecaille ..... Rigged up.
Humble Oil & Ref. Co.'s No. 3 Cockrell, Lake Grand Ecaille ..... Total depth 1,544 ft.; standing.
The Texas Company's No. 4 State, Garden Island ..... Reaming 3,900 ft.
The Texas Company's No. 5 State, Garden Island ..... Location.

ST. MARTIN PARISH

The Texas Company's No. 2 Iberville Land ..... Drlg. shale 3,708 ft.
The Texas Company's No. 3 Iberville Land ..... Location.
The Texas Company's No. 4 St. Martin, Hager ..... Derrick.
The Texas Company's No. 5, St. Martin, Hager ..... Location.

ST. MARY PARISH

The Texas Company's No. 1 South Coast, Sec. 41-14s-10e Drlg. shale 7,687 ft.

TERREBONNE PARISH

The Texas Company's No. 1 L.L.&E., Bay St. Elaine ..... Location.
Louisiana Gas & Fuel Co.'s No. 9 Minor, Houma ..... Rig.
The Texas Company's No. 5 State, Bay St. Elaine ..... Derrick.
The Texas Company's No. 4 States, Caillou Island ..... Location.
The Texas Company's No. 5 State, Caillou Island ..... Drlg. hard sand 1,180 ft.
The Texas Company's No. 3 State, Dog Lake ..... Drlg. sand and shale 2,780 ft.
The Texas Company's No. 4 La. L. & E., Four Isle ..... Drlg. sticky shale 3,524 ft.
The Texas Company's No. 2 La. L. & E., Bay Junop .... Sand 4,206-8 ft.; shut down for repairs.
The Texas Company's No. 6 State, Lake Pelto ..... Driving piling.
The Texas Company's No. 5 State, Lake Barre ..... Drlg. gumbo 3,120 ft.
The Texas Company's No. 6 State, Lake Barre ..... Driving piling.
The Texas Company's No. 7 State, Lake Barre ..... Driving piling.

SOUTHWEST TEXAS FIELDS

(Continued from Page 103)

chasing Co.'s No. 1 Holbien-Wormser is approximately 6 miles almost due south of the Houston Oil Co.'s No. 1 Lasater and the Humble-Shell's No. 2 Singer is approximately 2 miles a little south of east of the Southern Crude's test. Humble-Shell's No. 1 Singer was lost.

This activity is all in the northwestern corner of the county. In the southwestern corner of the county Ed East drilled 400 feet in his No. 2 Garcia after completing the No. 1 for a good gas well at 1,109 feet, and is standing.

William H. Barnhart is down 1,856 feet in a test 6 miles south of Hebbronville in Jim Hogg County and J. D. Pulliam is rigging up for a test 4 miles east of Hebbronville in the block where L. M. Holden drilled at one time.

Interesting new deals are getting started. Newton Oil Co. is going to drill on a block in western Lavaca County in the John A. Hueser Survey and is building the derrick. It is a test that will be watched with interest as it has "high powered" geology. Cosden Oil Co., which abandoned one deep test in San Patricio, is starting another in the Coleman-Fulton pasture land.

COMPLETIONS

Darst Creek Field—Guadalupe County

Gulf Production Co.'s No. 4 Thomas Dix, 750 feet from southeast line, 150 feet from northeast line of lease, J. R. Robinson Survey, total depth 2,541 feet; 1,200 bbls., 55 per cent water. Same company's No. 5 Thomas Dix, 450 feet from lease corner where Gulf, Magnolia and Louisiana's leases join, total depth 2,541 feet; 1,393 bbls. Same company's No. 6 Posey-Baker, 150 feet each way out of the west corner of the lease, J. R. Robinson Survey, total depth 2,598 feet; 1,650 bbls. Same company's No. 7 Posey-Baker, 800 feet from southwest line, 150 feet from northwest line of lease, J. R. Robinson Survey, total depth 2,595 feet; 600 bbls. Humble Oil & Refining Co.'s No. 16-A Denman, 150 feet north and 195 feet west of the northwest corner of the Willie lease, J. R. Robinson Survey, total depth 2,567 feet; 800 bbls. Louisiana Oil Refining Co.'s No. 6 Thomas Dix, 450 feet from southeast line, 150 feet from southwest line of tract, J. R. Robinson Survey, total depth 2,571 feet; 570 bbls. Magnolia Petroleum Co.'s No. 8 Thomas Dix, half way between No. 3 and No. 6, and 150 feet from north line of lease, J. R. Robinson Survey, total depth 2,577 feet; 400 bbls. estimated. The Texas Company's No. 9-B Knoblock, 150 feet each way out of the southwest corner of the company's Knoblock lease, J. R. Robinson Survey, total depth 2,558 feet; 90 bbls. first hour. Same company's No. 6 W. R. Posey, 150 feet from north and east lines of tract, J. R. Robinson Survey, total depth 2,602 feet; 1,740 bbls. Same company's No. 6 Henry Willie, 200 feet from west line, 150 feet from north line of lease, J. C. Darst Survey, total depth 2,600 feet; 600 bbls. Sun Oil Co.'s No. 9 Knoblock, total depth 2,544 feet; 480 bbls. Same company's No. 10 Knoblock, total depth 2,597 feet; 125 bbls. Same company's No. 11 Knoblock, total depth 2,531 feet; 600 bbls.

ABANDONED TESTS

Dobrowolski Pool—Bexar County

Bolling and Michael's No. 1 J. P. Adams, 150 ft. from south line, 300 feet from west line of lease, Miguel Gortaris Survey, total depth 662 feet; abandoned.

Chapman Pool—Williamson County

W. D. Anderson's No. 6-A T. P. Simmons; rigging up. Bartlett and Wilson's No. 1 R. E. Stewart, total depth 741 feet; drilling. Same parties' No. 2 R. E. Stewart, total depth 790 feet; drilling. E. L. Chapman's No. 6-B J. C. Abbott; derrick. J. L. Collins & Co.'s No. 5 M. V. Lawrence, 150 feet from west line, 515 feet from south line of 27-acre tract, S. Miller Survey, total depth 1,462 feet; in serpentine. E. R. Ertel's No. 1 H. Swanson, total depth 1,025 feet; shut down. Elliott and Moore's No. 1 A. J. Carlson, total depth 40 feet; shut down. F. Fuchs' No. 1 C. D. Johnson, total depth 1,200 feet; fishing. A. J. Luke's No. 1 A. Simmons, 500 feet from north line, 450 feet from west line of 25-acre tract, H. Owne Survey, total depth 2,210 feet; drilling. Manning and Anderson's No. 1 Cooper, total depth 1,292 feet; drilling. E. C. Mead's No. 1 Abbott, 100 feet from north and west lines of 6-acre tract, S. Miller Survey, total depth 2,166 feet; plugging back to 2,009 feet. Rheubotham's No. 1 S. H. Jarrell, total depth 40 feet; shut down. Rosenfield's No. 1 Pfluger, total depth 1,439 feet; reaming. M. M. Rowan's No. 1 A. Jackson, total depth 1,900 feet; shut down. G. Stratton's No. 5 J. C. Abbott, 450 feet from east line, 150 feet from south line of 32-acre tract, S. Miller Survey; drilling. Southland Development Co.'s No. 1 Lawler; location. Wilson and others' No. 1 C. Sitman, total depth 2,950 feet; shut down. R. S. Wilson's No. 1 J. A. Walker, total depth 700 feet; shut down.

Pettus Area—Bee County

Buchanan and Lefevre's No. 1, Block 20, Pettus Townsite, center of the block, total depth 300 feet; set surface casing. Batex Petroleum Co.'s No. 2 Burnett, 361 feet from north line, 900 feet to east line of lease, South John Pace Survey, total depth 3,810 feet; deepened to new level. Same compnay's No. 3 Burnett, 360 feet from north line, 600 feet from east line of north 100 acres out of 320-acre farm; location. Grayburg Oil Co.'s No. 1 Copeland, 450 feet from south line, 150 feet from east line of 20-acre tract; spudded. Hicks and Young's No. 1 Billingsley, 155 feet from south and west lines of tract, B. Q. Hadley Survey, total depth 360 feet; shut down. Houston Oil Co.'s No. 3 Neumann, 300 feet north of No. 1, 600 feet from south line, 300 feet from west line of 197-acre tract, George A. Kerr Survey, total depth 200 feet; drilling. Same company's No. 1, Block 21, Pettus Townsite, center of the block; location. Same company's No. 1. J. J. Mathews, center of Block 32, Pettus Townsite, total depth 3,913 feet; setting casing. Same company's No. 1, Block 39, Pettus Townsite, center of the block, total depth 2,950 feet; drill-

ing. Same company's No. 7 McKinney, 600 feet west of No. 6, and a south offset to Block 22 of Townsite of Pettus, total depth 2,300 feet; drilling. J. L. Mauldin's No. 1 Fee, 350 feet from south line, 700 feet east of the creek, George A. Kerr Survey, total depth 307 feet; set casing. Moody-Seagraves Producing Co.'s No. 2 McKinney, 1,200 feet due west of No. 1, 3,840 feet from east line, 450 feet from south line, R. A. McKinney tract, R. C. Ballard Survey; location. The Texas Company's No. 2 J. R. Scott, 200 feet from north line, 150 feet from west line, J. M. Uranga Survey, total depth 690 feet; drilling. Same company's No. 3 J. R. Scott, 7,100 feet southwest of No. 1, J. M. Uranga Survey; location. Union Producing Co.'s No. 17 Ray, 1,200 feet north of No. 11, total depth 4,395 feet; drilling shale. Same company's No. 18 Ray, east offset to Buchanan and Ogden's No. 1, Block 38, George Kerr Survey, total depth 3,914 feet; setting casing. Same company's No. 21 Ray, east offset to Block 40 of the townsite, 900 feet south, 150 feet east of northeast corner of the townsite, Kerr Survey, total depth 3,871 feet; coring. Same company's No. 23 Ray, east offset to Block 39, 1,260 feet south, 150 feet east of the northeast corner of the townsite, Kerr Survey, total depth 2,370 feet; drilling. Same company's No. 25 Ray, 1,700 feet from the south line and 1,400 feet from the east line of the P. Miller Survey; location. Same company's No. 26 Ray, 2,500 feet from the south line, 2,000 feet from the east line of P. Miller Survey; location. Same company's No. 30 Ray, 1,100 feet from south line, 600 feet from west line of W. J. Porter Survey, total depth 2,357 feet; drilling hard lime. Wilson and Hill's No. 1, Block 14, center of Block 14, Pettus Townsite; waiting on permit. Same parties' No. 1 Roberts, center of Block 16, Pettus Townsite; ready to spud. Nichols Oil Corp.'s No. 4 Hicks, 350 feet east of west line, 430 feet south of north line of Block 20, 930 feet due south of No. 3 Hicks, M. Uranga Survey, total depth 4,512 feet; pulling tubing to deepen.

LAREDO DISTRICT COMPLETIONS

Kohler Pool—Duval County

Humble Oil & Refining Co.'s No. 49 Kohler, Survey 172, total depth 1,767 feet, 15 bbls.

Jenning-Cuellar Pool—Zapata County

O. W. Killam's No. 29-B Cuellar, Survey 277, total depth 1,582 feet, 75 bbls.

Jennings—Muckleroy Pool—Zapata County

Allied Oil & Gas Co.'s No. 17-A Trevino, Block 6, Survey 65, total depth 1,253 feet, 50 bbls. Allied Oil & Gas Co.'s-Allen & Morris' No. 8 Gutierrez, Share 4, Fansler Partition, Comitas grant, total depth 1,277 feet, 50 bbls. W. R. Shankle's No. 4 Gutierrez, Share 4, Fansler Partition, Comitas grant, total depth 1,271 feet, 90 bbls.

ABANDONED TESTS

Jennings-Cuellar Pool—Zapata County

O. W. Killam's No. 4 (2) Hinnant, Survey 74, total depth 1,614 feet, plugged and abandoned.

NEW LOCATIONS

Jenning-Cuellar Pool—Zapata County

O. W. Killam's No. 30-B Cuellar, 2,200 feet from south line, 1,250 feet from southwest line, Survey 277.

Jennings-Muckleroy Pool—Zapata County

S. R. C. Oil Co.'s No. 4-B Cuellar, 450 feet from northwest line, 150 feet from southwest line, Block 1, Survey 65, total depth 1,029 feet, waiting for cement.

S. R. C. Oil Co.'s No. 5-B Cuellar, 450 feet from northwest line, 150 feet from southwest line, Block 10, Survey 65, total depth 1,050 feet, drilling.

W. R. Shankle's No. 5 Gutierrez, 1,500 feet from northeast line, Share 4, Fansler Partition, Comitas grant, total depth 1,265 feet, waiting on cement.

CALIFORNIA FIELDS

(Continued from Page 110)

Petroleum and K. C. Wallace all have projected deep tests under way. This field should be watched with extreme care as geological conditions are extremely favorable for the accumulation of substantial production possibly similar to the Temblor production developed at Kettleman Hills. Similar deep zone exploration is under way in the Lost Hills Field of Kern County and this development should also be watched closely as this field may also be ultimately found highly productive. The Bolsa Chica Oil Co., which is prospecting a potential oil structure east of the Elwood Field of Santa Barbara County, is making unusually slow footage. This is not due, however, to inefficiency but is a deliberate effort to drill a straight hole regardless of the time element. The company's No. 1 Goleta, located on State tideland permit No. 191 at Coal Oil Point in Santa Barbara County, is rotating ahead at 2,112 feet. That extreme care is being used in the drilling of this well is evidenced by the fact that instructions have been issued to its drilling crews not to use more than one point of weight at any time. A recent survey indicated that this hole was less than one-half of 1° off vertical. The upper part of this hole consisted of extremely hard silicious Monterey but passed into the Temblor, a much softer formation, at approximately 1,500 feet. Production is anticipated in this well in the Vaqueros formation, which should be encountered approximately 2,500 feet below the top of the Temblor.

LA.-ARK. FIELDS

(Continued from Page 100)

gauged 36,252,000 feet of gas at 802 pounds, total depth 2,450 feet.

Just at the end of the week it was reported that Loring Oil Co.'s No. 1 Trammell in Section 4-7-11, Sabine Parish, a quarter mile northwest of Pelican Natural Gas Co.'s big well that confirmed the eastern extension of Zwolle, had come in with 1,000 bbls. of clean oil but the report was somewhat exaggerated. It had a small show at 2,351 feet and was coring when this first report was checked up on. Arkansas Fuel Oil Co.'s No. 1 Russell in Section 26-8-12, the farthest north well in the Zwolle district, at 2,461 feet, is already below production in that immediate section of the district, but is setting 7-inch at 2,356 feet to see what it has. So far it has not had anything to test. Two of four new locations in Zwolle this week, both by the Dixie Oil Co., are in this locality of the field, No. 1 Parrott and No. 1 Tatum, both in Section 26-8-12.

Does Not Improve Prospect

Another well that did not make the shallow stuff in the northern extension of Zwolle look any better was The Texas Company's No. 1 Giauque in the SE SW, Section 27-8-12, three-quarters of a mile southwest of the group of producers in Section 26, and a west offset to Olsan Brothers' Hooker, which made a small amount of oil for a while but was abandoned as a failure. The Giauque well was dry at 2,422 feet and the Hooker at 2,672 feet after it had bailed dry in the 2,400-foot horizon.

Loring Oil Co.'s No. 1 Schuffert in the NE SE of the same section, a south offset to its 3,000-bbl. initial No. 1 Gardner, pumped 25 bbls. from 2,450 feet, 123 feet deeper than the Gardner. LeGrand Oil Co.'s location for No. 1 J. W. Hale in the NE NE, Section 1-7-13, is abandoned.

Magnolia Petroleum Co.'s No. 1 Giauque, a wildcat in Section 26-7-14, south of Blue Lake production, had 28 fourbles of salt water with a small show of gas, but no oil on drill stem test at 2,780 feet and is drilling below 2,800 feet. Paramount Petroleum Co. has resumed work on No. 1 Woolems, a wildcat in Section 11-6-12, which shut down at 2,225 feet a month ago and is drilling at 2,290 feet. Pelican Natural Gas Co. is arranging to test No. 14 Louisiana Long Leaf Lumber Co. in the NW SW, Section 4-7-11, at 2,557 feet. Loring Oil Co. is arranging to shoot No. 12 Bowman-Hicks, Section 33-8-12, which bailed dry on a small show of oil at 2,556 feet and drilled to 2,650 feet. No. 2 Schull in Section 26-8-12, tested dry at 2,640-43 feet and is temporarily abandoned.

Wilson and Sons cemented 15½-inch at 65 feet, 12½-inch at 286 feet and are

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drilling at around 700 feet, carrying 10-inch. They have approximately 4,200 acres in a narrow strip extending from Section 4-5-12, Sabine Parish, southwest through Township 4, Range 13, for a distance of about 7 miles. The well is on the Gandy-Garrett lease in the NW SW, Section 4-5-12, near the town of Negreet. Early wells in northwest Louisiana oil history were drilled in this territory. Some showed a little gas, some fresh water, others salt water and still others nothing at all. Toteco Oil Corp. which abandoned No. 1 Louisiana Long Leaf Lumber Co. in the NE NW, Section 18-6-12, as a junked hole at 4,077 feet after a gas blowout last July, has returned to the location and is cleaning it out to go deeper.

Stovall Drilling Co. is arranging to plug back to around 700 feet where it had a gas show in No. 1 Miller, Section 18-10-10, Tensas Parish, total depth 1,560 feet, and A. R. Willis and others' No. 1 Curry in the NW NW, Section 39-11-12, is waiting orders after getting salt water with a show of gas at 2,780 feet. Arkansas-Louisiana Pipe Line Co. has rig up for No. 1 Griffeth in Section 17-22-10, West Carroll Parish, north of the potential West Carroll gas area. Locations for three wells in the Sarepta district of Webster Parish are abandoned. Ideal Oil & Gas Co.'s No. 1 Coyle, SW SE, Section 24-23-11; Merric Oil Corp.'s No. 3 Slack, SW SE, Section 36-23-11; and W. O. Neely's No. 1 J. R. Slack, SW SW, Section 12-22-11. H. M. McIver has assembled 14,000 acres centering on Section 12-20-26, Lafayette County, along the Louisiana line northwest of Plain Dealing, Bossier Parish, and plans a 3,500-foot test.

Burnham Well Has Reported Show

Joe Burnham's No. 1 Burnett in the M. H. Janes Survey of Bowie County, Texas, 4 miles south of Texarkana, is reported to have a small show of oil on drill stem test in the top of the Nacatoch at around 965 feet and is coring. Natural Gas Products Co.'s No. 3 Moore in the B. C. Jordan Survey of Panola County, a deep test that has been holding attention for some time because of its location in the most productive area of the Bethany gas district, got salt water at 4,666 feet but has not yet been abandoned. Warran & Davis' location for No. 1 McNeese in the Abe Booker Survey, is abandoned.

A. G. Glassell's second wildcat along the east bank of the Mississippi River was a failure, as was the first. He abandoned No. 1 Artonish in the NE NE, Section 29-8-2w, Adams County, at 2,317 feet as a dry hole. No. 1 Stowers, Section 1-2n-5w, Wilkinson County, was abandoned at 4,017 feet. The former was on a block of 38,000 acres and the latter on a block of 40,000 acres. Whether he will drill others on the two blocks has not developed.

CANADIAN FIELDS

(Continued from Page 110)

berta, the Milk River structure is reported due for important developments. Anglo-Western Oils, Ltd., financed by British capital has been incorporated under Dominion charter to carry on development work in this area. The company holds 490,000 acres of oil leases in various parts of Alberta, a large portion being secured from the British Dominion Land Settlement Corp. and the balance from the federal government. Its holdings include 5,000 acres on the Milk River structure, 5,000 acres south of Turner Valley, and additional acreage in the Highwood, Wainwright, Birch Lake and Ribstone areas.

The officers include: President, Sir Edward Manville, chairman of the Phoenix Oil & Transport Co., and the Daimler Co. of Great Britain; managing director, J. C. Dallas, of Calmont Oils, Ltd.; directors, Sir William Cope, George Cursons, Col. A. W. Pryne-Jones, M. A. Brown, of England, and J. Coxon and F. C. Birks of Calgary.

The company's plans include the immediate drilling of two tests on the Milk River structure. Equipment for No. 1 test is now en route to the field, and work on No. 2 will be started about October 15. The company is capitalized at $5,000,000.

Red Coulee Field

In the northwestern section of the Red Coulee Field, Dalco Oil & Gas Co.'s No. 2, LSD 7, Section 19-2-17w4, is reported drilling below 1,700 feet. This well is designed to test an important potential extension of the Red Coulee producing area. Drilling is on acreage core-tested some time ago by S. E. Slipper, head geologist for Canadian Western Natural Gas, Light, Heat & Power Co. of Calgary; which holds some 24,472 acres in this area. Toward the south, Mr. Slipper estimated the prospective production horizon at 3,300 feet, with production in the northern section somewhat deeper.

Ontario Drilling

In the D'Clute Field, Kent County, Ontario, Union Natural Gas Co.'s No. 15, Storey farm, Lot 142, North Talbot Road, has finished as a good gasser at 1,560 feet. The well is reported making close to 5,000,000 feet, without a shot, and is on a par with No. 2 D'Clute, the largest well in the field. Union's No. 16, SE Lot 146, North Talbot Road, is drilling around 1,000 feet. American Engineering Co.'s No. 3, some 400 feet southwest of No. 2 producer on the south end of the John Dawson farm, Lot 147, South Talbot Road, is reported rigged up ready to spud in.

In Mosa Township, Middlesex County, Southern Ontario Gas Co.'s No. 4 has shifted location to Lot 16, Concession 3, about 500 feet west of the east line and 300 feet south of the north line of the lot. The test is rigging up.

According to an official statement, Ajax Oil & Gas Co. has finished six small commercial producers on the Six Nations Indian Reserve near Brantford, and is preparing to lay a pipe line to deliver the production to the Southern Ontario Gas Co.'s system.

British Columbia Test

In British Columbia, Pacific Petrol Products, Ltd., of Victoria, B. C., is preparing to drill for oil close to Dorr station, about 40 miles south of Fernie. The company has 95-foot derrick up and is unloading and installing machinery, test to spud in early in October with 20-inch hole. This is the first test to be drilled in this section of the Kootenay Valley.

KANSAS FIELDS

(Continued from Page 98)

and Phillips Petroleum Co. and others' No. 1 Horsch, NE cor. SE, Section 14-26-5w, is dry and abandoned at 4,108 feet.

Rice County

Slick, Pryor & Lockhart moved the rig in for No. 2 Schurr, NE cor. NW SW, Section 21-20-10w, Raymond Pool. Location has been made for No. 3 Schurr, NW cor. NE SW, Section 21-20-10w. Gypsy Oil Co.'s No. 1 Koch, CWL E half E half NW, Section 35-20-9w, has been abandoned at 3,546 feet.

Sumner County

Carter Oil Co.'s No. 1 Frankum, NE cor., Section 32-31-1w, has been completed for 110 bbls. in chat 3,640-80 feet.

Sedgwick County

Fisher & Lauch's rig is up for No. 7 Trustee, SE cor., Section 19-27-2. Magnolia Petroleum Co. has the cellar dug for No. 2 Eastborough, NW cor. NE NE, Section 19-27-2, Eastborough Pool. Derby Oil Co.'s No. 4 Eastborough, NE cor. NW NE, Section 19-27-2, is a cellar. The rig is being built for No. 2 Rimel, NE cor., Section 30-27-2. Aladdin Petroleum Co. and Fisher & Lauch moved tools in for No. 1 Russell, CEL W half SE SW, Section 27-28-1. M. R. Buck and others' No. 1 McManman, NE cor. NW NW, Section 2-29-1, is a rig. Fisher & Lauck's No. 4 Trustee, SE cor. SW SE, Section 19-27-2, has been completed for 1,200 bbls. in Wilcox sand 3,241-48 feet. No. 5 Trustee, SW cor. SE SE, Section 19-27-2, made 1,300 bbls. in Wilcox sand 3,237-51 feet.

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ROYALTIES—PRODUCTION

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(ADDITIONAL CLASSIFIED WANTS ON NEXT PAGE)

Gasoline and Kerosene Prices Reduced

Standard of Indiana Lowers Price 2 Cents Throughout Territory. Speculate on Effect on Crude Schedule

By John B. Waldo

CHICAGO, Sept. 29.—Station and tank wagon prices of gasoline and the tank wagon price of kerosene were reduced 2 cents a gallon over the entire territory of the Standard Oil Co. (Indiana) today. The reduction is from the normal price and where prices have been reduced previously more than 2 cents the old prices remain in force. Word of the reduction was given out Saturday afternoon and the trade was generally informed of the change. The immediate result was to reduce buying of gasoline to the minimum amounts which must be had and the market was very quiet today. It is not expected that a dependable price basis will be reached before Wednesday.

If there were any surprise in the price reduction it was that the amount was not greater. The new prices will help at some points, but in most the opportunities for price cutting still exist. The major refiners made no change in the price of 6½ cents, Group 3, for U. S. Motor gasoline. Some expressed themselves of the opinion that this price might hold, but others that the price would settle a little, and they only hoped that the decline would not be important.

The reduction made in the tank wagon scale has brought back with greater force than ever the belief that crude prices will be cut at an early date. Several refiners expressed themselves of this opinion, but they have held the idea for months and have not seen their beliefs come true.

The consumption of gasoline over the week-end was only fair as the weather was too cool for much motoring. The most active item in the days' sales was furnace oil. Gas oils and light fuel oils are in demand and prices are very strong. Anything from 26 gravity up is in demand at the higher prices which are asked. Kerosene was in light demand with prices tending toward greater ease. The industrial demand for heavy fuel oils was not active today. Many of the first-of-the-month buyers are not in the market as yet and it is possible that they bought enough during September to last them over into October. Prices were unchanged although the idea of lower crude prices had a weakening tendency.

Regarding the gasoline situation there is no doubt that the present refinery prices are not out of line with the new tank wagon scale and they might be even a little higher but the tendency of so many commodities is still downward and this is not without influence on the buyers and makes it more difficult to secure higher prices or to even maintain the present level of refinery quotations in the face of a reduction in the prices to the consumer. Were the refiners in possession of more orders in advance it would add much to the strength of the situation.

Mystery in an Incident

An incident in the neighboring State of Wisconson illustrates several conditions in the local market. Some one of the numerous governmental bodies in that State had advertised for bids on two cars of gasoline, U. S. Motor grade. Twenty-two oil companies made bids. These bids were divided into two classes according to the prices quoted. There were bids at either 6½ or 6⅜ cents, made by refiners, and another set of bids at less than 6 cents a gallon made by marketers or resellers of gasoline. The query is at once forced upon the trade, where did the gasoline come from which was quoted at the lower prices by the resellers of refinery products? The answer is that it was gasoline bought over the month of September and before the beginning of that month and at the prices prevailing then. Yet several of the bidders for the business referred to have assured the writer that that they own no gasoline, but simply cover their sales as the sales are made. The order was obtained by a Chicago marketing concern at 5.70 cents, Group 3.

Gasoline Demand Tight

The demand for gasoline in this market was not heavy during last week. Many in the trade believe that a reduction in the tank wagon scale would result in the jobbers, in many cases, increasing their stocks of gasoline by a small amount, for many of them are working on a small supply of material and during the winter months they need to carry a larger supply to allow for the occasional delays in transportation. The buying was confined largely to the contract accounts as the spot buyers for some reason seemed to be well supplied for immediate needs.

One of the large integrated companies, it is reported, has signed for the sale of Ethyl Gasoline. The name of the concern is kept quiet at present but it is expected that it will be given out early in October. Representatives of the Ethyl Gasoline Corp. say the announcement will occasion surprise.

Conditions in Detroit are bad still, and generally there is much cutting of prices in Indiana and Michigan. A contributing cause to this unsettled condition is the reported receipt of West Coast gasoline and of gasoline from Venezuelan crude refined on the Atlantic Coast at points as far west as Detroit and some points in Indiana. If these deliveries continue, the result will be that the refiners which supply this trade regularly will have to work farther west to get business. Natural gasoline continues strong at 6 cents for all grades.

Kerosene Marked Up

Kerosene has been marked up by refiners but with little effect on the market, for the demand is not active nor are prices strong. The kerosene tank wagon price is regarded as certain to decline when the gasoline prices are reduced and this for one reason makes the jobber prefer small stocks on hand. The chief use of kerosene today is tractor fuel but even this demand is being undermined by the use of distillates and of gasoline, separate or mixed. There was plenty of 41-43 kerosene available to the trade at 3⅛ cents although some refiners have advanced their prices to 3½ cents.

The furnace oil business is not as active as it was during the first two weeks of the month owing to the lack of consumption as the weather has been too warm for the sale of furnace oils. There has been less filling of the customers' tanks in advance this season, largely as a matter of credits. The trade as a rule has not followed the precedent of previous years and filled customers' tanks at an early date, giving them a dating on the bill. This meant a credit to the customer and he practically expected the same length of credits on every delivery. So this season it has been found that it was better to wait until the customer actually needed the oil and ordered it. Then it could be charged as a cash account. The demand is with the home trade for a better grade of oils. The jobbers are exact in their specifications and insist that they receive exactly what they order.

The tank car dealers say that a little later in the season when the demand is better, the trade will not be so careful in regard to quality but will accept oils that they reject today.

Color Affects Demand

There has been demand for a prime white distillate, which had to be about as good as kerosene. Some refiners ran a quantity of this but have no more to ship. The only reason for this demand for an oil of this character is the looks of the article. It does not burn a bit better because of the color. In fact it should not burn with as great heat or as long as a darker oil. Some of the specifications are prepared by the makers of the burners with the idea of getting an oil which would give as little trouble as possible.

The high-grade distillates are firmly held but the immediate demand is not active. Gas oils are slightly higher in price. The straw gas oils are almost unobtainable right now. The output is limited and it is mostly under contract for the season. All zero gas oils are firmly held and promise to advance with larger buying. The output is not as great as it usually is at this time of the year, as so many refineries are working on a reduced schedule. The lighter fuel oils are firmly held. One reason for the strength of this market is the withdrawal from the market of the Shell Petroleum Corp., which in some years has been the principal source of supply. The only ones selling the local trade are the smaller refiners who have a limited supply at best and they are holding for full prices in most cases.

Straightrun Gas Oil Selling Slowly

The straightrun gas oil is selling slowly as the gas makers are not buying heavily. Some gas-making plants have gone back to coal on account of the demand for coke and others are buying a fuel rather than a gas oil. The market for a good U.G.I. gas oil is firm. There has been a little oil of the character with a 60° cold test which was being offered at 2 cents but the low refinery price for a strictly U.G.I. gas oil is 2⅛ cents, which price it is hard to get from the gas companies. However, they will have to pay it for the right kind of material. The consumption is probably a little short of last year owing to the substitution of coal and of fuel oil but it is apparently equal to the supply.

The furnace oil demand for the lighter fuel oils is just about fair right now, having decreased with the other products, but it will come back again and strongly with the first cold snap. Some refiners are holding their 28-30 fuel oil at not less than 85 cents a barrel, Group 3. In the 24-26 gravity there have been some offers of a little lower prices by one or two refiners who have some accumulations which they would like to move, but the quantity of this oil available is so small that the prices are firmly held.

In heavy industrial fuels, the present inquiry is light. During the first two weeks of the month, there were more inquiries for oil from industrial concerns than had been received by these same sellers during the preceding three months. But with these inquiries out of the way, there has come a waiting spell and the demand is light. In the country districts, sellers who have been making the rounds and sizing up the situation report a large number of their former customers are still closed down and have no prospects of shortly reopening. Some of these concerns have fuel oil in their tanks which they had when operations were suspended in the spring or early summer. With colder weather there will come a demand for oil for heating and this seems to be the best influence for an increase in demand.

Prices for fuel oil are probably a little higher on the wanted grades but at the same time in cases of competitive bidding the quotations made show no signs of higher prices. The trouble is that there is more supply than demand, at least more sellers than buyers of fuel oil. The plants, while there have been many to make a start, are not working full. The industrial outlook is for a slow, gradual increase in activity. The usual price quoted for a 18-22 fuel oil is 47½ to 50 cents, while a few weeks ago the price might have been 42½ cents. But today the oil must be a zero oil. This latter is not plentiful. During the first two weeks of this month there were numerous inquiries and a fair amount of closed business, but during the past 10 days the demand has fallen off.

The first of the month buyers have not made inquiries for their October supply which leads to the suspicion that they bought more than they needed in September, and may be slow in ordering.

The railroads are slow in the matter of taking out their oil and those who sell them say that it is because they are not using as much oil as they usually do at this time of the year, that their storage is full and that they have no place to

(Continued on Page 360)

CLASSIFIED

(Continued from Preceding Page)

RANCHES AND FARM LANDS

RANCH—OIL—GAME—COAL
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Prices in East Undergoing Adjustment

Cuts Which Have Brought Undercover Competition Into the Open Expected to Prove Healthy Corrective Measure

By A. E. Mockler
New York Bureau, The Oil and Gas Journal, Rooms 1919-21, No. 154 Nassau Street

NEW YORK, Sept. 29.—Drastic measures were taken this week to adjust the gasoline situation in eastern markets, and while the substantial reductions in refinery and tank wagon and service station prices for a time threw the market into confusion, it is evident at this date that the price cuts, which have brought much of the undercover competition out into the open, will prove ultimately to be a healthy corrective measure with a favorable reaction.

The drastic lowering of the posted price for U. S. Motor gasoline at refineries in this area was not as extensive as would appear from the record. Although the posted price was cut from 9 to 7¾ cents per gallon in tank car lots, the actual reduction in going prices amounted to but a quarter to three-quarters cent per gallon, in as much as the large bulk of spot trading was being done between 8 and 8½ cents, and in some instances down to 7¾ cents per gallon.

Leaders in the industry for the past month or more have pointed to the fallacy of maintaining a fictitious price level for gasoline at a time when the majority in the industry were actively endeavoring to lower excess stocks, and it is expected that the current price cut will give further impetus to this move, making spot markets much less attractive to those few in the refining branch of the industry who have been consistently overproducing.

Newspaper comment in the East is inclined to attribute the price cut in tank wagon and service station gasoline in South Atlantic territory to the recent arrival at Baltimore of a cargo of Soviet gasoline, and the probability of additional imports from this source. This Russian competition is not regarded seriously by the eastern trade, however. It is recognized that the Soviet is desperately endeavoring to convert as much of its natural resources as possible into cash to help defray the cost of its ambitious "Five-Year Plan," and it is realized that the Soviet interests are prepared to meet any competition which may develop. The Russian shipment, and any which may follow in the near future, are "distressed lots" in the true sense of the word, it is believed, and the industry long ago learned the fallacy of endeavoring to compete in price with distressed gasoline.

The current reductions in refinery gasoline prices have done much to remove the uncertainty which has existed for the past several weeks, and it is believed that the market has, through the medium of these cuts, progressed satisfactorily toward that stabilization which principal interests have been striving for.

Refinery Gasoline

The cut of 1¼ cents per gallon on U. S. Motor gasoline by Standard Oil Co. of New Jersey early in the week was the signal for a general lowering of refinery prices to meet this figure on the part of the other large sellers in the East, and 7¾ cents per gallon is now the posted price on the majority of leading brands.

Some sellers are still quoting from 8 to as high as 9½ cents a gallon, f.o.b. refinery terminals in tank car lots, but these prices are largely nominal, and the marketers quoting the higher levels are "meeting competition."

Jobbers have been buying gasoline a little more freely in the spot market since the price cut, but are still showing a disposition to proceed slowly and are not disposed to buy more than a week ahead of requirements.

Tank Wagon Gasoline

Principal marketers operating in Standard of New Jersey territory have met the tank wagon and service station price reductions on gasoline and kerosene named by that company, and it is expected that the posted price schedule in New York and New England will be cut a cent a gallon or more any day now. Marketers operating in the latter territory are apparently holding back waiting for Standard Oil Co. of New York to take the lead, while that company, mindful perhaps of the charges advanced at the recent hearing of the government's case seeking to block the Socony-Vacuum merger, is apparently unwilling to take the initiative in moving the market to lower levels.

The retail market in New York is badly demoralized still, and the same is true of many points in New England territory. In New York City standard brands of gasoline can be bought at filling stations at 13 cents and a fraction over, with the discounts which are now being allowed. One of the leading companies is again issuing "coupon books," giving the buyer a discount on his purchases, and many of the old price cutting devices which were believed to have gone out of the picture permanently with the adoption of the code of ethics, are again being witnessed.

Ethyl compounds can be bought at retail at 7 gallons for $1.25, and the price cutting is apparently extending to all brands of both ordinary and premium gasolines.

Gasoline consumption is holding up well in this area, but the failure of total demand to show the expected rate of increase over 1929, coupled with the excessive multiplicity of retail states, combine to make for a most unhealthy situation in the retail end of the business.

Kerosene

There has been but a moderate demand for kerosene in the tank car market this week, the cut in the tank wagon price apparently having given rise to the belief that a reduction in the refinery price was about to develop.

Leading refiners are quoting 41-43 water white at 6¾ cents per gallon, in tank car lots, but it is stated that this price is being shaded in many instances, and jobbers are shopping the market thoroughly before placing their orders.

The tank wagon situation in New York and New England territory is easy and the trade is looking for a cut in the posted schedule, in line with the action taken by Standard Oil Co. of New Jersey and others in the South Atlantic States.

Lubs

Buying continues of limited volume in the cylinder oil market this week and while there have been no further price changes reported, the market is expected to go to slightly lower levels on practically all grades.

Selling pressure is still in evidence in some parts of the field, and it is evident that while the curtailed production of Pennsylvania lubs has helped the situation a little, the market cannot hope to benefit fully from this restricted output until some of the overstocked refiners succeed in liquidating additional quantities of their surplus lub oil.

Domestic buyers are still operating along conservative lines, limiting their purchases almost entirely to immediate requirements, and export buyers have also shown a tendency to adhere to a hand-to-mouth buying policy.

Red and pale oils were without price change during the week, but the market undertone is less firm and it is believed that the easing off in consumption will shortly force a lowering of spot quotations.

Paraffin Wax

There has been rather a sluggish tone to the market this week, with new business at a minimum and the market showing some signs of weakening. There was a fair volume of export buying reported during the middle of the month, but inquiry has fallen off since that time, and there was little inquiry in evidence during the week just ended.

While sellers were quoting the market at the fractional price advances attained during the previous fortnight, the undertone had eased off a little, and it was reported that quoted levels were susceptible to shading by about an eighth cent per pound on a firm bid.

Domestic consumers are carrying smaller inventories than normal for this season of the year, but notwithstanding this condition, operators here are coming to the conclusion that that long awaited heavy buying movement will not be witnessed at all, and that consumers will continue to limit their purchases to quantities essential for prompt and nearby requirements, continuing to carry but limited reserve stocks until the business situation shows definite signs of straightening itself out.

Fuel Oil

The cut of 10 cents per barrel in bunker "C" oil during the previous week has readjusted the market to changed conditions, although there has been no perceptible increase in consumption as a result of the lowered price basis. Steamship companies continue to draw stocks against contract in substantial volume, and it is indicated that sales totals for the full year will show some slight improvement over 1929.

Last week's price reduction at East Coast refinery terminals was rather unexpected, and was believed due more to the competitive situation from outside refining territories than to any development in the East. Progress has been made by eastern refiners in cutting down excess stocks, and with current output curtailed somewhat, the outlook for the fuel oil market had been regarded in a more optimistic vein. It was known, however, that fairly substantial quantities of fuel oil were pressing for sale at the Gulf and in California at prices that would have made it possible to ship this oil to East Coast ports and undersell the local market, even taking into consideration the high tanker market, and it was this situation that was responsible in some measure for the naming of a lower basis at eastern refinery terminals.

Refinery movement of furnace oils has shown some improvement during the past week.

Standard Oil Co. of New Jersey reduced bunker "C" fuel oil 10 cents per barrel to $1 f.o.b. terminals at Texas City, Corpus Christi and Ingleside, and 5 cents per barrel at Baytown, effective September 24, and corresponding reductions are looked for at New Orleans and Baton Rouge.

Diesel Oil

This market once again gave evidence of its underlying firmness by holding unchanged at the $2 level in the face of the 10-cent cut on bunker "C." There was a good movement of Diesel oil this week, both to the marine and domestic trades.

Gas Oil

With daylight saving time going off the books with the start of October, the outlook in the gas oil market has improved perceptibly, and the market is a shade firmer. The posted price holds at 5¼ cents a gallon, and while some shading is being done, 5 cents appears to be the average going price, as against 4⅝ to 4¾ cents per gallon hitherto. Large gas manufacturing companies are drawing stocks against contracts more heavily, and this business is expected to show steady improvement as the fall season progresses.

Gulf Export Market

Although no formal reduction in posted prices at the Gulf has been made, these quotations are being freely shaded by 1½ to 2 cents per gallon on certain specifications, and the market has livened up considerably as a result. A summary of inquiries in the market during the week, several of which will probably be closed within the next several days, follows:

5,000 tons of 64-66 and 1,000 tons of Navy for October-November shipment to France. Reported quoted at 8 cents for 64-66 and 7 cents for Navy, Gulf basis.

4,000 tons of 64-66 for October-November shipment to Germany. Reported quoted on at 8 cents, Gulf.

6,500 tons of 64-66 for October-November shipment to United Kingdom and/or Continent. No quotation reported as yet.

10,000-12,000 tons California 400 endpoint gasoline for the United Kingdom, October-November loading; reported quoted on at 7 cents per gallon.

Several part-cargoes of 2,000 to 3,000 tons 64-66 each were reported placed during the past week, but the quotations at which this business was taken were not available. It was reported that the sellers had secured the business by quoting a c.i.f. price equivalent to a cargo basis, and independent operators who quoted on a basis figuring part-cargo freight rates did not succeed in closing any of the business.

Great Britain was reported in the market for an 8,000 to 10,000-ton cargo of 60-62, 375 endpoint California gasoline, for October 15-November 15 loading, but up to the time of writing this business had not been closed.

The local export trade was greatly interested in the arrival of a cargo of Russian high test gasoline at Baltimore and reports that other cargoes were afloat for North Atlantic United States ports or would shortly be shipped here. It is reported locally that this gasoline is coming in on consignment, and it is believed that the current sharp price reduction in gasoline markets in this area will tend to discourage other shipments from abroad.

California Oil Receipts

Receipts of California crude and refined petroleum at Atlantic and Gulf Coast ports for the week ended September 20 totaled 219,000 bbls., a daily average of 31,286 bbls., compared with 445,000 bbls., a daily average of 63,571 bbls. for the week ended September 13 and a daily average of 67,036 bbls. for the four weeks ended September 20. Details follow:

(Barrels of 42 Gallons)

At Atlantic Coast Ports—	
Baltimore	27,000
New York	75,000
Philadelphia	78,000
Others	39,000
Total	219,000
Daily average	31,286
At Gulf Coast Ports—	
All ports	None
At Atlantic & Gulf Coast Ports—	
Total	219,000
Daily average	31,286
Daily average four weeks	67,036

Distribution of total California imports is as follows:

Gasoline	216,000
Lubricants	3,000

Shipments of California refined products eastward for the week (with ownership of tanker moving the oil where such

(Continued on Page 360)

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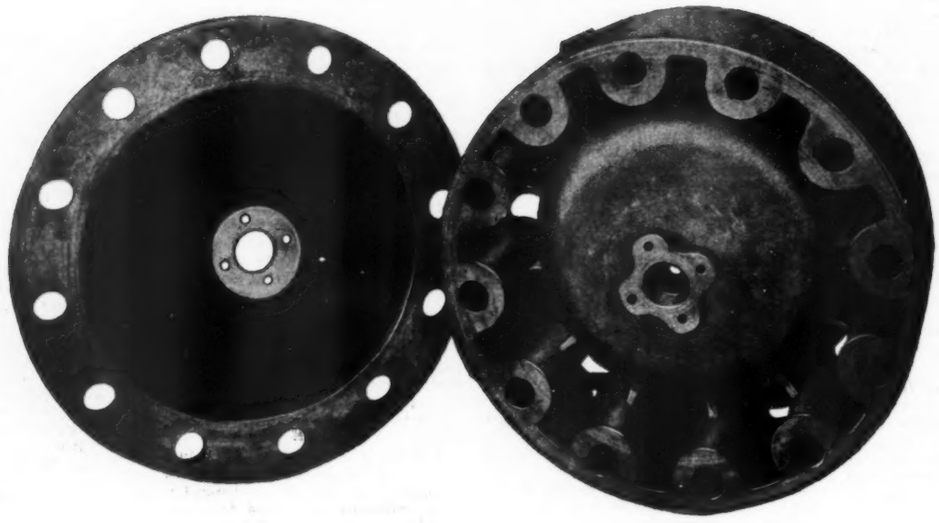

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Manufacture of Natural Gasoline

Slight Increase in Gasoline Output of West Coast Plants

One hundred thirty-eight natural gasoline plants in California with a daily indicated capacity of 2,488,100,000 cubic feet, report a recovery of 68,878,285 gallons of natural gasoline from 48,641,107,000 cubic feet of gas treated in August. This is an increase of 309 bbls. in daily average production.

Utilization of natural gasoline amounted to 1,657,664 bbls., a decrease under July of 190,528 bbls. Daily average utilization of 53,473 bbls. was 571 bbls. more than daily average production of 52,902 bbls.

Stocks of natural gasoline at the end of August amounted to 1,800,777 bbls., of which 38,151 bbls. were reported by natural gasoline plant operators and 1,762,626 bbls. by refinery operators. This is a decrease of 17,705 bbls. under July stocks. This stock figure of 1,800,777 bbls. is approximately 33½ days' supply at the current rate of consumption.

CALIFORNIA NATURAL GASOLINE PRODUCTION, DISTRIBUTION AND STOCKS AUGUST, 1930

Production by Fields

	Gas treated M.C.F.	Natural gasoline produced (gallons)
Fullerton and Whittier	715,966	1,354,273
Midway	2,932,741	4,518,585
Huntington Beach	923,991	2,656,129
Long Beach	7,488,285	14,901,948
Richfield	736,735	900,670
Santa Fe Springs	11,697,622	16,136,778
Seal Beach	1,246,135	1,986,885
Ventura Avenue	4,806,320	4,960,217
All other fields	18,093,312	21,462,800
Total	48,641,107	68,878,285

Production by Methods

Type of plant—	Gas treated M.C.F.	Natural gasoline produced (gallons)
Oil absorption	39,598,364	55,657,089
Compressor	234,169	268,947
Combination comp. and oil absorption	8,808,574	12,952,249
Total	48,641,107	68,878,285

Finished gasoline produced at plants, bbls. 20,782

Distribution

	Bbls.	Bbls.
Stocks first of month		1,818,482
Produced during month		1,639,959
Quantity mixed with crude or unfinished oils	96,994	
Used in blending at refineries	1,483,189	
Stocks end of month	1,800,777	
Balance*	77,481	
Total	3,458,441	3,458,441

*Includes evaporation losses, purchases by jobbers for blending, etc.

Stocks

	Gallons
Natural gasoline held by natural gasoline plant operators	1,602,329
Natural gasoline held by refineries	74,030,292
Total	75,632,621

PROPOSE NEW PLANT

HUNTINGTON BEACH, Calif., Sept. 29.—The Superior Oil Co. has asked permission from the city council to construct a $250,000 gasoline plant on the east edge of the Huntington Beach Field. The plant will be designed to handle 5,000,000 feet of gas daily.

START PLANT IN JAPAN

Japanese capital has started construction on a natural gasoline plant at Kinsui, Japan. Several million cubic feet of gas daily is available near the plant. The plant product will be sold to refineries in Japan.

NATURAL GASOLINE PLANTS CAUSE ONLY SMALL GAS VOLUME SHRINKAGE

Only 13.4 per cent of the natural gas produced in California is recovered as natural gasoline or consumed as fuel in the natural gasoline plants of the State according to Claude C. Brown, engineer for the California Railroad Commission. During the period between July 1, 1929 and June 30, 1930, the State is said to have produced 599,543,424,000 feet of natural gas of which 80,478,702,000 feet was recovered as natural gasoline and burned as fuel. The largest factor in accounting for the disposition of the balance of the gas is waste and operating losses. These factors total 279,786,570,000 feet or 46.7 per cent of the total.

While this appears as a vast quantity to go unused, the waste during this period was decreased to almost one-half that of the year previous. Deep drilling and the bringing in of abnormally large wells has complicated the problem greatly. Gas pressures have been encountered up to 3,500 pounds and equipment of special design is being constantly made necessary.

A table showing the relation between gas production and waste is shown here for the past 10 years.

The increasing volume of gas used for repressuring and storage may be seen in the fact 2.6 per cent of the production is now accounted for in this manner. As the gas pressure decreases in the existing fields the practice of repressuring will no doubt be extended and a greater volume of gas will likely be utilized in this manner over the future.

The storage of gas in the earth has also been a relatively new development but is limited to those localities where a suitable type of geological structure exists. The exact percentage of recovery of this stored gas is difficult to determine but should this be practiced on a large scale, there is every reason to think the proportion between the volume of gas wasted and used will be appreciably increased and the construction and operation of natural gasoline plants will be made profitable in fields where residue gas is of little or no value, especially during the periods of development and flush production.

For convenience a tabulation of the production, utilization and wastage in California for the year July 1, 1929 to July 1, 1930, is shown below:

	Cu. ft.	Per cent
For repressuring and storage	15,428,477	2.6
Gasoline plant shrinkage and for fuel in plants	80,478,702	13.4
Field fuel	77,006,793	12.8
Refining fuel	18,554,883	3.1
Sales and gas utilities	128,176,999	21.4
Waste and operating Loss	279,786,570	46.7
Total	599,432,424	100.0

SUMMARY, YEARS 1920-1929, INCLUSIVE, AND FIRST SIX MONTHS OF 1930

Years—	Total field production M.C.F.	Total utilization M.C.F.	Total wastage M.C.F.
1920	68,650,000	62,630,000	6,020,000
1921	82,000,000	72,000,000	10,000,000
1922	120,600,000	94,000,000	26,600,000
1923	319,262,352	129,148,352	190,114,000
1924	248,519,406	121,097,406	127,422,000
1925	236,646,717	145,152,717	91,494,000
1926	274,364,773	189,084,773	85,280,000
1927	293,435,459	219,250,459	74,185,000
1928	316,830,147	239,239,423	77,590,724
1929	557,634,175	309,157,574	248,476,601
1930 to July 1	289,949,232	157,679,139	132,270,093
Total	2,807,892,261	1,738,439,843	1,069,452,418
Percentages	100%	62%	38%

Who's Who
IN NATURAL GASOLINE MANUFACTURE

SIGNAL OIL & GAS CO.

The Signal Oil & Gas Co.'s position in the natural gasoline industry is somewhat unique in that for several years it has been a successful manufacturer in both the California and Mid-Continent fields. There is very little overlapping among manufacturers between these two areas which produce approximately 85 per cent of all the natural gasoline in the United States, the big and little manufacturers confining their operations to one or the other area.

The Signal company has nine plants, six of which are located in the Los Angeles Basin, two in Texas and one in Oklahoma. These plants have an approximate daily capacity of 190,000 gallons daily. The Texas plants are operated under the name of the Signal Gasoline Co. of Texas.

General operating offices are located in the Signal Building at 811 West Seventh Street, Los Angeles, Calif. R. H. Green, vice president, is in charge of manufacturing for the company. R. W. Heath is general superintendent of the California plants. The output of California plants is sold on a long-time contract to one of the large California companies and moved by pipe line from the plants to a refinery in the Los Angeles area.

The two Texas plants are located in the Big Lake Field of Reagan County. The bulk of the casinghead gas for these two plants comes from two wells which are producing at depths of approximately 8,500 feet. These two plants, the second of which was completed last month, are now producing approximately 55,000 gallons of natural gasoline daily. L. A. Boyd is superintendent of these plants.

A Mid-Continent sales office is maintained at Tulsa to handle sales from the Texas plants and one located at Bristow, Okla. R. R. Rosier is in charge of the Tulsa office.

Following is a list of the company's plants:

SIGNAL OIL & GAS CO.

Location—	Daily capacity gallons
Signal Hill, Calif.	30,000
Signal Hill, Calif.	30,000
Signal Hill, Calif.	15,000
Signal Hill, Calif.	15,000
Signal Hill, Calif.	35,000
Maricopa Flats, Calif.	7,500
Near Bristow, Okla.	5,000
SIGNAL GASOLINE CO. OF TEXAS	
Big Lake Pool, Reagan County, Tex.	30,000
Big Lake Pool, Reagan County, Tex.	30,000
Total	187,500

PHILLIPS TO START TWO MORE PLANTS OCTOBER 1

Within the next week the Phillips Petroleum Co., Bartlesville, Okla., expects to start the operation of two new natural gasoline plants. One of these is located in the Hobbs Field in New Mexico, and will have a capacity of 60,000 gallons when completed. Because of proration of crude in this field the plant will not be placed on a full operating schedule but will probably make only about 25,000 gallons daily during October. As the crude production is permitted to increase and more gas is made available, the plant will be brought up to its full capacity. The gas in this area varies considerably in gasoline content, the charcoal absorption test showing a variation of from .2 gallon to 2.0 gallons per thousand feet. The average for the field will approximate three-fourth gallon per 1,000 feet. This plant includes three absorption units two of which will be operated on well pressure and the third, or stripping unit has been supplied with compressors.

The other new Phillips plant is located in Ector County, West Texas, southwest of Odessa. This will be known as the Judkins plant. It will have a capacity of 25,000 gallons per day but will also be operated at less than capacity due to proration. The probable production of this plant will approximate 10,000 gallons per day during October and will be increased only as fast as the proration permits additional gas to become available.

TWO KETTLEMAN HILLS PLANTS

LOS ANGELES, Calif., Sept. 30.—Work is being rushed to complete two additional natural gasoline plants in the Kettleman Hills Field in California. One of these is the Superior Oil Co.'s plant in Section 29-21-17, on the North Dome. It will be capable of making 270,000 gallons of natural gasoline daily and is being rushed to completion because of the large flow of wet gas coming from the new well on the Huffman lease. The plant is said to cost $450,000.

The other plant being built is that of the Standard Gasoline Co. and is located near the Superior Oil Co. plant, since the Standard's well is an offset to the Superior well. This is the third plant to be built by the Standard in the North Dome.

After completing these, the North Dome will have a total of seven plants, including one built by The Texas Company, one by the Western States Gasoline Corp., the Los Nietos plant, and the two plants of the Standard Gasoline Co., previously mentioned.

ADD STABILIZING UNIT

Cromwell & Franklin are adding a crude oil stabilizing unit at their plant in Trosper Park of the Oklahoma City Field. As in other installations in the Oklahoma City Field, this new unit will be operated in connection with the natural gasoline plant.

In these installations the highest gravity crudes are preheated and the lightest gasoline fractions are removed before the crude is delivered to the crude oil buyers. This assures a uniform gravity in the crude sold and gives a small yield of gasoline having specifications similar to natural gasoline.

REBUILD MAGNOLIA PLANT

The Magnolia Petroleum Co. has replaced some of its absorption and distillation equipment at its plant located in the Earlsboro Field of Oklahoma. The capacity of the plant is unchanged.

Brief Items for Petroleum Refiners

BALLARD HEADS MARKET DEPARTMENT OF WILCOX

A. M. Ballard, who recently resigned as sales manager for the Oklahoma district of the Sun Oil Co., has been appointed manager of the marketing department of the Wilcox Oil & Gas Co., according to an announcement by George A. Dye, vice president of the latter company.

Mr. Ballard is widely known in Mid-Continent refining and natural gasoline circles. He was connected with the natural gasoline department and later the sales department of the Sun company and its affiliated interests for a period

A. M. Ballard

of 14 years. Previously he was engaged as an operator in the early development of the natural gasoline industry.

He will have charge of the sales for the Wilcox refineries located at Bristow, Okla., and Pampa, Tex., and the company's natural gasoline plants. He will also have supervision of the company bulk and retail station sales. Headquarters for the sales department are located at the general offices in Tulsa.

TEXAS AND PACIFIC TO BUILD PLANT AT TEMPLE

The Texas Pacific Coal & Oil Co. has announced plans for a 2,000-bbl. refinery to be located at Temple, Tex. Oil will be taken from the Atlantic Pipe Line from New Mexico and West Texas to Houston, running near the town of Temple, or crude may be shipped directly from McCamey via the Santa Fe Railroad. The Texas Pacific Coal & Oil Co. has considerable production in West Texas and Lea County, New Mexico, and in the Ranger district. Most of the company's production from the Ranger district is run to its Fort Worth refinery.

The refined products from the Temple refinery will be distributed through the retail stations in south and east Texas which were recently acquired from the Central Texas Refining Co. at Corsicana, and which enlarged the company's marketing system to a great extent.

Cost of the plant will run in the neighborhood of $500,000. Location of the plant is 1 mile north of Temple on the Santa Fe Railroad. About six months will be consumed in construction, and before it can be put into operation.

COMPLETE MERGER OF VACUUM AND WADHAM COMPANIES' PROPERTIES

The merger of the Wadhams Oil Co. and the Vacuum Oil Co. which has been pending for several weeks has been completed, according to official announcements of the two companies. The merger, which becomes effective immediately, was consummated on a basis of 90 shares of Wadhams stock for 90 of Vacuum.

The merger materially strengthens the position of the Vacuum company as a refiner and marketer of petroleum products in the Middle West. The Wadhams company, which was established in 1879, for years has been known as one of the largest independent marketing companies, with headquarters in Milwaukee. Last year the company was merged with the Bartles-Maguire Oil Co., which also had marketing facilities with a 4,000-bbl. refinery at East Chicago, Ind.

The combined companies are said to have 250 company-owned bulk and retail stations selling approximately 50,000,000 gallons of gasoline yearly. The bulk of these marketing facilities are in Wisconsin. In addition, the company has a large number of dealer accounts. A. G. Maguire has been president of the company since the consolidation with the Bartles-Maguire company. The same management will continue to operate the company with no changes in personnel.

Regarding the merger, the Vacuum company officially stated: "It is expected that through this union great benefits will come to each company, as it brings together two companies well known and prominent in their respective fields. From the viewpoint of economy the union should be an ideal one, in that the present and prospective activities of each company will complement and not duplicate the facilities and operations of the other."

The Vacuum merger with the Wadhams properties follows the recent purchase of the White Star Refining Co., with large refining and marketing facilities in Michigan and a second refinery at Wood River, Ill. Last year the company acquired control of the Lubrite Refining Co., also an independent refining and marketing organization with headquarters in St. Louis. The Vacuum company also has acquired controlling interest in a number of jobbing concerns in the Middle West.

O'NEAL SUPERINTENDENT OF LOUISIANA REFINERY

James A. O'Neal has been appointed superintendent of the Bossier City, La.,

James A. O'Neal

refinery of the Louisiana Oil Refining Corp.

Mr. O'Neal joined the manufacturing department of the Louisiana corporation several years ago when the first cracking unit was built at the Bossier City refinery. Previously he had been connected with refinery operations of the Standard Oil Co. (New Jersey). He has held various positions with the refining department of the Louisiana corporation.

DISPUTE ARISES AS TO HYDROGENATION PATENTS

NEW YORK, Sept. 29.—Conflicting views concerning control of basic patents covering the production of petroleum products through hydrogenation have developed with publication by Chemical Foundation, Inc. of a notice under the signature of Francis P. Garvin, president, relating to the claims of the foundation to several basic patents covering hydrogenation. These patents, the notice states, consist of several which were included in the alien property custodians seizures of German patents during the World War, and cover the hydrogenation of carbon compounds from various materials including oil and coal under high pressure and elevated temperatures. These processes known as the Bergius patents were patented by the Chemical Foundation to cover the years expiring between 1935 and 1937, inclusive, the notice states.

Neither the Chemical Foundation nor officials of Standard Oil Co. of New Jersey are inclined to comment on the hydrogenation patent situation pending further developments. Beyond stating that the Bergius patents have been public property, plus a royalty to the Foundation, and are not subject to question, officials of the Chemical Foundation have not commented further, although it is understood unofficially that they hold the view that their patents cover the basic process for hydrogenation of petroleum and that when commercial production of petroleum through hydrogenation gets under way they will give further consideration to the validity of their patents.

Officials of the Standard Oil Co. of New Jersey beyond expressing the opinion that their patents, now held by Hydro Patents Corp. are beyond question, are not willing to comment further. It is understood from one official of the New Jersey company that in as much as the company has nothing to sell, not intending to offer any further hydrogenation licenses at this time, its sole duty is to the stockholders of Hydro Patents Corp., and that nothing is to be gained by inaugurating any controversy regarding patent rights until such difficulty arises.

PRICE CUTTING BRINGS STANDARD REDUCTIONS

CHICAGO, Sept. 30.—A cut of 2 cents a gallon in the service station and tank wagon price of gasoline and 2 cents on kerosene was made by the Standard Oil Co. of Indiana, effective at the opening of business Monday morning, September 29.

The cut was made at all points in Michigan, Wisconsin, Indiana, Illinois, Minnesota, Iowa, Missouri, North Dakota, South Dakota and Kansas, except where local adjustments to meet competition have already been made.

In Chicago the service station price for U. S. Motor grade gasoline is now 17 cents, including 3 cents state tax. The tank wagon price is 1 cent less.

Unsound conditions in the oil industry forced the Indiana company's action, ac-

(Continued on Page 362)

PHILLIPS OPENS OFFICE

CHICAGO, Sept. 29.—The Phillips Petroleum Co. has arranged to open its Chicago offices in the Straus Building, Room 401. At the present time the representative of the company is located temporarily in Room 1501, but will be in his new offices very shortly. R. N. Mullins is in charge.

SHELL MOVES OFFICES

HOUSTON, Tex., Sept. 27.—Shell Petroleum Corp. over the week-end completed removal of its Houston offices from the Post-Dispatch Building to the Sterling Building, which has just been completed on an opposite corner. The Gulf Coast division offices will occupy three floors, the fifteenth, sixteenth and seventeenth.

TO OFFER TELEGRAPH SERVICE

NEW YORK, Sept. 27.—Richfield Oil Corp. of New York, eastern marketing subsidiary of Richfield Oil Co. of California, has completed arrangements with the Western Union Telegraph Co. for the installation of Western Union offices at a number of its filling stations, and the handling of telegrams via Western Union at all its retail stations.

VACUUM DECISION SOON

NEW YORK, Sept. 30.—An early decision of the government suit to prevent merger of Standard Oil Co. of New York and Vacuum Oil Co., two former units of the old Standard Oil Co. of New Jersey, is expected. The case will come up for argument before the United States District Court for the Eastern District of Missouri on October 6. Subject to the decision of the court, Standard Oil Co. of New York and Vacuum Oil Co. have completed plans for consolidation into a new company, General Petroleum Corp. The merger, if permitted, will be effected through the exchange of stock on a basis already agreed upon.

JOBBERS SELL OUT

CHICAGO, Sept. 29.—Among the sales of jobbing companies recently reported are those of the Lane Oil Co., of Bloomington, Ill., which was bought by the Phillips Petroleum Co., and of the jobbing business of H. B. O'Hair of Chicago Heights which was purchased by the Vacuum Oil Co.

LICENSE FEES IN ESCROW

CHICAGO, Sept. 29.—Owners of filling stations in Chicago who are opposing the collection of the city license fee on the ground that the city has no right to make the levy, appeared in the Municipal Court and agreed to deposit a sum in escrow sufficient to cover the 1929 and 1930 fees. If the suit is decided in their favor the money will be returned. The total sum was stated to be more than $500,000.

Griscom-Russell

Heat Transfer Apparatus

SEE OUR EXHIBIT AT THE INTERNATIONAL PETROLEUM EXPOSITION

Booths 42-43
Oklahoma Bldg.

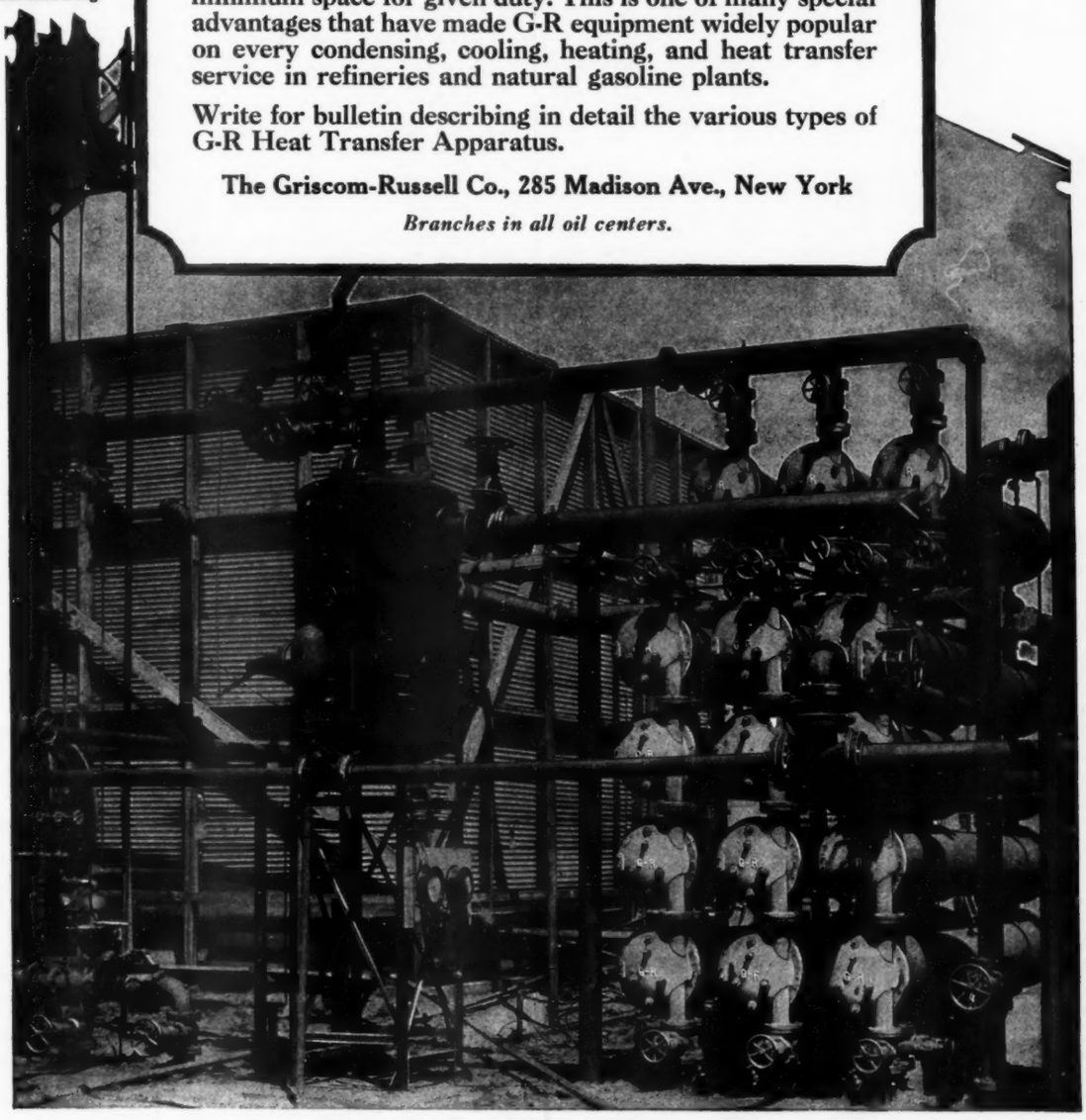
NOTE the compact arrangement of this group of G-R Heat Exchangers. The head connections are arranged to permit close spacing without the complication of elbows or inter-connecting piping.

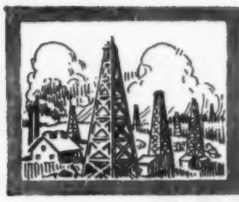
The design of G-R Heat Transfer Apparatus also provides exceptional compactness of the units themselves, requiring minimum space for given duty. This is one of many special advantages that have made G-R equipment widely popular on every condensing, cooling, heating, and heat transfer service in refineries and natural gasoline plants.

Write for bulletin describing in detail the various types of G-R Heat Transfer Apparatus.

The Griscom-Russell Co., 285 Madison Ave., New York

Branches in all oil centers.





REFINERY AND CRUDE PRICES

Quotations on refined products are for interstate or export movement unless otherwise noted.

GASOLINE AND NAPHTHA

OKLAHOMA (Group 3)—	Sept. 30		Sept. 23		Sept. 16	
50-52 450 endpoint	.05¾	.06¼	.06	.06¼	.06	.06¼
56-58 450 endpoint	.05¾	.06	.06	.06¼	.06	.06¼
*58-60 437 endpoint (U. S. Motor)	.0627		.0634		.0633	
*60-62 437 endpoint	†.06¼	.06½	†.06¼	.06½	†.06¼	.06½
*60-62 400 endpoint	.0681		.0688		.0688	
*64-66 375 endpoint	.0725		.0725		.0725	
68-70 360 endpoint	.07¼	.07½	.07¼	.07½	.07¼	.07½
64-66 437 endpoint (blend)	.05¾	.06¼	.05¾	.06¼	.05¾	.06¼
NORTH TEXAS—						
50-52 450 endpoint	.05¾		.06	.06¼	.06	.06¼
58-60 450 endpoint	.05¾		.05¾	.06	.06	.06¼
58-60 437 endpoint (U. S. Motor)	.05¾	.06	.06	.06¼	.06¼	.06¼
60-62 400 endpoint	.06	.06¼	.06¼	.06½	.06¼	.06½
64-66 390 endpoint	.06¼	.06½	.06⅝	.06⅝	.06⅝	.06½
64-66 375 endpoint	.06⅜	.06¾	.06½	.06¾	.06⅝	.06¾
68-70 360 endpoint	.07	.07¼	.07	.07¼	.07	.07¼
64-66 437 endpoint (blend)	.05¾	.06	.05¾	.06	.05¾	.06
*NORTH LOUISIANA—						
58-60 437 endpoint (U. S. Motor)	.07		.07		.07	
*ARKANSAS—						
58-60 437 endpoint (U. S. Motor)	.07		.07		.07	
PENNSYLVANIA—						
52-54 Naphtha	.06¾		.06¾		.06¾	
54-56 Naphtha	.06¾	.07	.06¾	.07	.06¾	.07
58-60 Gasoline	.06¾	.07	.06¾	.07	.07	.07¼
60 Gasoline	.07	.07¼	.07	.07¼	.07¼	.07½
62 Gasoline	.07¾	.08	.07¾	.08	.08	
64 Gasoline	.07¾	.08	.07¾	.08	.08	
68-70 350 endpoint gasoline	.08½	.08¾	.08½	.08¾	.08¾	
CALIFORNIA—						
†58-60 437 endpoint (U. S. Motor) domestic	.08	.09½	.08	.09½	.08	.09
†60-62 400 endpoint domestic gasoline	.09	.10½	.09	.10¼	.08¾	.10
CHICAGO DISTRICT (Based on Group 3)—						
50-52 450 endpoint (Naphtha)	.05¾	.06	.05¾	.06	.06	.06¼
56-58 450 endpoint	.05¾	.06	.06	.06¼	.06	.06¼
58-60 437 endpoint (U. S. Motor)	.05¾	.06	.06	.06½	.06¼	.06½
60-62 400 endpoint	.06⅛	.06¼	.06⅜	.06⅝	.06⅜	.06⅝
64-66 375 endpoint	.06⅜	.06½	.06⅝	.06⅞	.06¾	.07
68-70 360 endpoint	.06¾	.07	.06⅞	.07⅛	.07	.07¼
64-66 437 endpoint (blend)	.06⅛	.06½	.06¼	.06½	.06¼	.06½
‡GULF COAST (Export)—						
58-60 U. S. Motor	.08		.08		.08	
60-62 400 endpoint	.09		.09		.09	
61-63 390 endpoint	.09¼		.09¼		.09¼	
64-66 375 endpoint	.09½		.09½		.09½	

*Weighted average prices September 29, 22 and 15 as reported by representative refiners. Sales to jobbers only. †No sales reported. Prices show general market.

*Louisiana, Arkansas, Mississippi and East Texas delivery. †For local consumption. ‡Prices posted by Export Petroleum Association, Inc. Prices published from August 19 to September 16, inclusive, included other quotations and were discontinued September 23. No change has been made in the association's quotations since February, 1930.

NATURAL GASOLINE

OKLAHOMA (Group 3)—	Sept. 30	Sept. 23	Sept. 16
Grade A, 72-79.9, 375 e.p., rec. 90%	.06	.06	.05¾
Grade AA, 80-87.9, 375 e.p., rec. 90%	.06	.06	.05¾
Grade B, 76-83.9, 375 e.p., rec. 85%	.06	.06	.05¾
Grade BB, 84-92, 375 e.p., rec. 85%	.06	.06	.05¾
Grade C, 80-92, 375 e.p., rec. 78%	.06	.06	.05¾
NORTH TEXAS—			
Grade A, 72-79.9, 375 e.p., rec. 90%	.06	.06	.05¾
Grade AA, 80-87.9, 375 e.p., rec. 90%	.06	.06	.05¾
Grade B, 76-83.9, 375 e.p., rec. 85%	.06	.06	.05¾
Grade BB, 84-92, 375 e.p., rec. 85%	.06	.06	.05¾
Grade C, 80-92, 375 e.p., rec. 78%	.06	.06	.05¾
NORTH LOUISIANA—			
Grade AA, 80-87, 375 e.p., rec. 90%	.06 .06¼	.06 .06¼	.05¾ .06
Grade BB, 84-92, 375 e.p., rec. 85%	.06	.06	.05¾
Grade C, 80-92, 375 e.p., rec. 78%	.06	.06	.05¾
CALIFORNIA—			
75-78, 375-390 endpoint	.07 .08¼	.07 .08¼	.07 .08
CHICAGO DISTRICT (Based on Group 3)—			
Grade A, 72-79.9, 375 e.p., rec. 90%	.06	.06	.05¾
Grade AA, 80-87.9, 375 e.p., rec. 90%	.06	.06	.05¾
Grade BB, 84-92, 375 e.p., rec. 85%	.06	.06	.05¾

BURNING OIL

OKLAHOMA (Group 3)—	Sept. 30		Sept. 23		Sept. 16	
41-43 water white kerosene	.03⅛	.03¾	.03⅛	.03¾	.03¼	.03¾
42-44 water white kerosene	.03½	.04	.03½	.04	.03½	.04
NORTH TEXAS—						
41-43 water white kerosene	.03	.03¼	.03	.03¼	.03	.03¼
40-41 water white kerosene	.02⅞	.03	.02⅞	.03	.02⅞	.03
*NORTH LOUISIANA—						
41-43 water white kerosene	.04¼	.04½	.04¼	.04½	.04¼	.04½
*ARKANSAS—						
41-43 water white kerosene	.04¼	.04½	.04¼	.04½	.04¼	.04½
PENNSYLVANIA—						
43 Kerosene prime white	.04¾		.04¾		.04½	
45 Kerosene water white	.05¼		.05¼		.05	
46 Kerosene water white	.05¼		.05¼		.05	.05¼
300 Mineral Seal	.05½		.05½		.05½	
CALIFORNIA—						
38-40 water white Kero. (high burning test)	.04¾	.06	.04¾	.06	.04¾	.05¾
CHICAGO DISTRICT (Based on Group 3)—						
41-43 water white kerosene	.03⅛	.03½	.03	.03⅜	.03	.03¼
42-44 water white kerosene	.03½	.03¾	.03⅜	.03¾	.03⅜	.03⅝
GULF COAST (Export)—						
41-43 prime white	.06		.06		.06	
41-43 water white	.07		.07		.07	

*Louisiana, Arkansas, Mississippi and East Texas delivery.

FUEL OIL

OKLAHOMA (Group 3)—	Sept. 30		Sept. 23		Sept. 16	
Below 18 Fuel Oil, per bbl.	.45	.50	.45	.50	.45	.50
18-22 Fuel Oil, per bbl.	.47½	.52½	.47½	.52½	.47½	.52½
20-22 Fuel Oil, per bbl.	.50	.57½	.50	.57½	.50	.57½
22-26 Fuel Oil, per bbl.	.55	.60	.55	.60	.55	.60
24-26 Fuel Oil, per bbl.	.65	.70	.65	.70	.60	.65
26-30 Fuel Oil, per bbl.	.70	.75	.70	.75	.65	.75
28-30 Fuel Oil, per bbl.	.75	.85	.75	.85	.70	.80
32-36 Gas Oil (industrial)	.02⅛	.02¼	.02⅛	.02¼	.02⅛	.02⅓
32-36 Gas Oil (straw color, high cold test)	.02¼	.02½	.02¼	.02½	.02¼	.02½
32-36 Gas Oil (straw color, low cold test)	.02⅝	.02¾	.02⅝	.02¾	.02⅝	.02¾
36-38 Distillate	.02¾	.02⅞	.02¾	.02⅞	.02¾	.02⅞
38-40 Straw Distillate	.02¾	.03¼	.02¾	.03¼	.02¾	.03¼
38-40 Straw Distillate (low cold test)	.03	.03¼	.03	.03¼	.03	.03¼
NORTH TEXAS—						
Below 20 Fuel Oil, per bbl.	.40	.50	.40	.50	.40	.50
24-26 Fuel Oil, per bbl.	.60	.65	.60	.65	.60	.65
32-36 Gas Oil (industrial)	.02	.02¼	.02	.02¼	.02⅛	.02¼
38-40 Straw Distillate	.02¾	.03	.02¾	.03	.02¾	.03
*NORTH LOUISIANA—						
18-20 Fuel Oil, per bbl.	.80	.85	.80	.85	.80	.85
30-32 Gas Oil	.02⅞		.02⅞		.02⅞	
*ARKANSAS—						
33-36 Distillate	.02¾	.03	.02¾	.03	.02¾	.03
30-32 Gas Oil	.02¾	.02⅞	.02¾	.02⅞	.02¾	.02⅞
16-22 Refinery Fuel Oil, per bbl.	.65	.70	.65	.70	.65	.70
GULF COAST (South Texas)—						
Gas Oil	.03¾		.03¾	.04	.03¾	.04
Bunker C Fuel (cargo lots), per bbl.	.75	.80	.75	.80	.75	.80
Bunker C Fuel (small lots)	1.00		1.05	1.10	1.05	1.10
PENNSYLVANIA—						
30-34 Fuel Oil	.03⅝		.03⅝		.03⅝	
36-40 Fuel Oil	.04	.04¼	.04		.04	
CALIFORNIA—						
33-36 Distillate	.02	.02½	.02	.02½	.02	.02½
26-32 Distillate	.01¾	.02	.01¾	.02	.01¾	.02
15-20 Fuel Oil, Bunker (at tidewater)	.65	.95	.65	.85	.65	.80
15-20 Fuel Oil (cargo lots), per bbl.	.55	.85	.60	.80	.60	.75
27 plus Diesel, per bbl.	.85	1.00	.80	.95	.75	.90
CHICAGO DISTRICT (Based on Group 3)—						
22-26 Fuel Oil, per bbl.	.52½	.57½	.52½	.57½	.55	.60
18-22 Fuel Oil, per bbl.	.47½	.52½	.47½	.52½	.45	.52½
28-30 Fuel Oil, per bbl. (zero)	.80	.85	.77½	.82½	.77½	.82½
32-36 Gas Oil (zero)	.02½	.02¾	.02¾	.02¾	.02¾	.02¾
32-36 Gas Oil (industrial)	.02¼	.02⅜	.02¼	.02⅜	.02¼	.02⅜
38-40 Straw Distillate	.02¾	.03	.02¾	.03	.02¾	.03

*Louisiana, Arkansas, Mississippi and East Texas delivery.

LUBRICATING OIL AND WAX

OKLAHOMA (Group 3)—	Sept. 30		Sept. 23		Sept. 16	
100 vis., 2 color, 20-25 cold test	.06	.06½	.06	.06½	.06	.06½
100 vis., 3 color, 20-25 cold test	.05½	.06	.05½	.06	.05½	.06
150 vis., 3 color, 20-25 cold test	.07¼	.07½	.07¼	.07½	.07¼	.07½
150 vis., 4 color, 20-25 cold test	.07		.07		.07	
180 vis., 3 color, 23-28 cold test	.08½	.09	.08½	.09	.08½	.09
180 vis., 4 color, 23-28 cold test	.08¼	.08½	.08¼	.08½	.08¼	.08½
180 vis., 5 color, 23-28 cold test	.08		.08		.08	
200 vis., 3 color, 23-28 cold test	.10	.10¼	.10	.10¼	.10	.10¼
200 vis., 4 color, 23-28 cold test	.09½	.10	.09½	.10	.09½	.10
200 vis., 5 color, 23-28 cold test	.09¼	.09½	.09¼	.09½	.09¼	.09½
240 vis., 3 color, 25-30 cold test	.13½	.14	.13½	.14	.13½	.14
240 vis., 4 color, 25-30 cold test	.12½	.13	.12½	.13	.12½	.13
240 vis., 5 color, 25-30 cold test	.11½	.12	.11½	.12	.11½	.12
280 vis., 3 color, 25-30 cold test	.15½	.16	.15½	.16	.15½	.16
280 vis., 4 color, 25-30 cold test	.14½	.15	.14½	.15	.14½	.15
280 vis., 5 color, 25-30 cold test	.13½	.14	.13½	.14	.13½	.14
Cylinder Stocks:						
600, steam refined, light green	.08	.12	.08	.12	.08	.12
600, steam refined, dark green	.06	.08	.06	.08	.06	.08
190-200 vis., D color, Bright Stock	.30		.30		.30	
150-160 vis., D color, Bright Stock	.23	.25	.25		.25	
*150-160 vis., D color, Bright Stock	.21	.23	.22	.24	.22	.24
150-160 vis., E color, Bright Stock	.20	.23	.23		.23	
Waxes:						
124-126 White Crude Scale Wax	.02	.02⅛	.02	.02⅛	.02	.02⅛
PENNSYLVANIA—						
34 Neutral	.05½	.06½	.05½	.06½	.05¾	.07
34 Sundebloom	.05½		.05½		.05½	
36 Miners' Neutral	.05¾		.05¾		.05¾	
150, 3 color	.11½	.13	.11½	.13	.11½	.13½
180, 3 color	.16	.17	.16	.17	.16	.17
200, 3 color	.18	.19½	.18	.19½	.18	.19½
220, 3 color	.23		.23		.23	
600, steam refined	.11	.12	.11	.12	.11½	.12
635, steam refined	.16	.17	.16	.17	.15	.17
650, steam refined	.16½	.17	.16½	.17	.15½	.17
600, Pennsylvania Flash	.17	.18	.17	.18	.18	.19½
630, Pennsylvania Flash	.25	.26	.25	.26	.26	.28
600, E filtered	.15	.17	.15	.17	.15½	.17
600, D filtered	.19	.21	.19	.21	.19	.21
Pennsylvania Bright Stocks	.25		.25		.25	
*122-124 White Crude Scale Wax	.02⅜		.02⅜		.02¼	
124-126 White Crude Scale Wax	.02⅜		.02⅜		.02¼	

*High cold test. All bright stock prices are for domestic movement.

*At New York.

GULF COAST (South Texas)—						
100 vis., 2-2½ color, pale oil	.06½	.06¾	.06½	.06¾	.06½	.06¾
200 vis., 3 color, pale oil	.09½		.09½		.09½	
300 vis., 3 color, pale oil	.10¾		.10¾		.10¾	
500 vis., 3½ color, pale oil	.12	.12¾	.12	.12¾	.12	.12¾
750 vis., 3½ color, pale oil	.13½		.13½		.13½	
1,200 vis., 3½ color, pale oil	.16		.16		.16	
2,000 vis., 6 plus color, red oil	.17		.17		.17	
200 vis., 5-6 color, red oil	.08¾	.09	.08¾	.09	.08¾	.09

REFINERY AND CRUDE PRICES

Quotations on refined products are for interstate or export movement unless otherwise noted.

300 vis., 5-6 color, red oil	.10	.10¼	.10	.10¼	.10	.10¼
500 vis., 5-6 color, red oil	.11¼		.11¼		.11¼	
750 vis., 5-6 color, red oil	.12¾	.13	.12¾	.13	.12¾	.13
1,200 vis., 5-6 color, red oil	.15		.15		.15	
2,000 vis., 4 color, pale oil	.17		.17		.17	
200 vis., 2½ color, filtered oil	.11	.12	.11	.12	.11	.12
300 vis., 2½ color, filtered oil	.12	.13	.12	.13	.12	.13
CALIFORNIA—						
130 vis., 2½-3 color	.09	.09¼	.09	.09¼	.09	.09¼
200 vis., 2½-3 color	.10	.10¾	.10	.10¾	.10	.10½
300 vis., 3-3½ color	.10¾	.11¼	.10¾	.11¼	.10½	.10¾
350 vis., 3½-4 color	.11½	.11¾	.11½	.11¾	.11	.11¼
400 vis., 3½-4 color	.12¼	.12¾	.12¼	.12¾	.12	.12½
Red Neutral:						
200 vis., 4½-5 color	.10	.10½	.10	.10½	.10	.10¼
300 vis., 5-6 color	.10½	.11	.10½	.11	.10½	.10¾
400 vis., 5-6 color	.12	.12½	.12	.12½	.12	.12¼
500 vis., 4½-5 color	.13	.13½	.13	.13½	.13	.13¼
500 vis., 5-6½ color	.13	.13½	.13	.13½	.13	.13¼
600 vis., 6½ plus color	.13	.14	.13	.14	.13	.13¾

Note—Bright stocks are not manufactured commercially on the Pacific Coast.

NEW YORK (BAYONNE) REFINERY PRICES

	Sept. 30		Sept. 23		Sept. 16	
Gasoline, U. S. Motor, 58-60, 437 e.p.	.07¾		.07¾	.09	.08	.10
Kerosene, water white, 41-43	.06¾		.06¾		.06¾	
*Fuel Oil, Bunker "C," 41-43	1.00		1.05		1.15	
Fuel Oil, Diesel, 28-30, per bbl.	2.00		2.00		2.00	
Gas Oil, 32-36 gravity	.04¾	.05¼	.04¾	.05¼	.04¾	.05¼
25 pale Paraffin Oil, tank car	.10¼		.10¼		.10¼	
28 pale Paraffin Oil, tank car	.07¼		.07¼		.07¼	
280 red Paraffin Oil, tank car	.12½		.12½		.12½	
250 red Paraffin Oil, tank car	.11½		.11½		.11½	
225 red Paraffin Oil, tank car	.10		.10		.10	
200 red Paraffin Oil, tank car	.09¼		.09¼		.09¼	
Refined Wax:						
120-122 a.m.p., per lb.	.03⅛		.03⅛		.03	
125-127 a.m.p., per lb.	.03⅜		.03⅜		.03⅜	
130-132 a.m.p., per lb.	.03¾		.03¾		.03¾	
133-135 a.m.p., per lb.	.04½		.04½		.04½	
135-137 a.m.p., per lb.	.04¾		.04¾		.04¾	
Petrolatum in barrels, in carload lots, per pound:						
Dark Green	.01⅜		.01⅜		.01⅜	
Amber	.03¼		.03¼		.03¼	
Extra Amber	.03⅜		.03⅜		.03⅜	
Cream	.06		.06		.06	
Lily White	.06⅝		.06⅝		.06⅝	
Snow White	.08		.08		.08	

*Lighterage 5.0 cents a barrel extra.

NEW YORK (BAYONNE) EXPORT PRICES

	Sept. 30	Sept. 23	Sept. 16
600, steam refined cylinder stocks, in bbls.	.17	.17	.17
635, steam refined	.19	.19	.19
650, steam refined	.23	.23	.23
600, Pennsylvania Flash	.28	.28	.28
630, Pennsylvania Flash	.31	.31	.31
600, Warren E	.24	.24	.24
600, Oil City E	.23	.23	.23
Light 140-150 Bright Stocks	.30	.30	.32 .33
Dark 140-150 Bright Stocks	.28	.28	.30 .31

LOS ANGELES EXPORT PRICES

	Sept. 30		Sept. 23		Sept. 16	
Kerosene, water white	.04½	.05½	.04¼	.05¼	.04	.05
*U. S. Motor Gasoline, 53-55, 437 e.p.	.06½	.07½	.06¾	.07½	.06¾	.07¼
*60-62, 400 endpoint gasoline	.08¼	.09½	.08½	.09¾	.08½	.09½

*Prices on coastwise shipments.

CRUDE OIL PRICES

OKLAHOMA, KANSAS, NORTH AND EAST CENTRAL TEXAS

Oklahoma City—Same as other Mid-Continent price schedule except Empire Pipe Line Co. posted all oil 40 gravity and above at $1.43 on April 10.
Corsicana heavy (April 10, 1930).....$ .80
Other fields.....See gravity table

TEXAS PANHANDLE

Gray County, Wheeler County and Carson-Hutchinson Counties—See gravity table.
In Noel-McConnell district, Prairie Oil & Gas Co. posted April 10, below 30 degrees, 75½ cents, with 5-cent differential upward to 34-34.9, $1.00½, and then a 3-cent differential upward to 44 and above at $1.35½.

WEST TEXAS

Iatan*.....Same as North Texas
Crane-Upton-Crockett, Pecos, Winkler, Mitchell and Ector.....
.....See gravity table, Column 3
Howard and Glasscock.....
.....See gravity table, Column 9
Chalk† (April 10, 1930).....$ .75

*Includes Westbrook Field. †Posted by Humble Oil & Refining Co.

ARKANSAS-NORTH LOUISIANA

Smackover, below 24 gravity (April 11, 1930).....$ .90
Smackover, 24 gravity and above (April 11, 1930).....1.05
Carterville, Sarepta and Cotton Valley, below 36 gravity (April 11, 1930).... .85
Bellevue (April 11, 1930).....1.15
Urania (April 11, 1930).....95
East El Dorado (April 11, 1930).....90
Other fields.....See gravity table
Cotton Valley crude above 36 gravity takes same gravity price schedule as shown for North Louisiana and Arkansas crude in Mid-Continent gravity price table.

Note—Smackover, Cotton Valley and Bellevue posted by Standard Oil Co. Louisiana and Magnolia Petroleum Co.; Urania posted by Louisiana Oil Refining Corp.; East El Dorado posted by Magnolia Petroleum Co.

Grade A (April 10, 1930)*.....$1.15
Grade B, 25° and upward..See gravity table
Jennings, La., (April 10, 1930)†.....1.10
Refugio (light).....Same as Grade B
Refugio (heavy) (April 10, 1930)‖.....85
Sorrento (April 10, 1930)‡.....1.10
Markham (April 10, 1930)‖.....85
High Island (April 10, 1930)¶.....95

*Humble Oil & Refining Co. †Gulf Pipe Line Co. ‡Sun Pipe Line Co. §Texas Pipe Line Co. ¶Posted by Gulf Pipe Line Co. ‖Humble Oil & Refining Co. and Gulf Coast Pipe Line Co.

ROCKY MOUNTAIN STATES

Ohio Oil Co.-Midwest Refining Co.
(Effective April 11, 1930)

Iles (Feb. 15, 1930).....$ .87
33 gravity and above.....87
Under 33 gravity.....85
Dutton Creek (Feb. 15, 1930).....1.25
Rock Creek, Wyo.....1.35
Salt Creek.....See gravity table
Big Muddy.....1.38
Grass Creek, heavy (July 27, 1928).....90
Grass Creek, light.....1.55
Mule Creek (May 21, 1929).....1.20

(Continued on Page 356)

CRUDE OIL GRAVITY TABLE

Gravity—	1 Oklahoma-Kansas	2 North Central Texas No. La., Arkansas	3 Crane, Upton, Ector, Crockett, Winkler, Pecos, Mitchell (West Texas) Lea, N. Mex.	4 Wheeler County (Texas Panhandle)	5 Gray County (Texas Panhandle)	6 Carson and Hutchinson (Texas Panhandle)	7 Salt Creek, Wyo.	8 Stephens, Ark.	9 Howard-Glasscock (West Texas)	10 Grade B Gulf Coast and Refugio Texas
Below 25	.75	.72	.65	....	....	....	....	....	.65	1.06
25 to 25.9	.80	.77	.68	..	..	..	....	....	.68	1.02
26 to 26.9	.85	.82	.71	....	....	....	....	....	.71	1.06
27 to 27.9	.90	.87	.74	....	....	....	....	.76	.74	1.09
28 to 28.9	.95	.92	.77	....	.75½	....	..	.81	.76	1.12
29 to 29.9	1.00	.97	.80	.75½	.80½	....	1.00	.86	.78	1.15
30 to 30.9	1 05	1.02	.83	.80½	.85½	....	1.05	.91	.80	1.18
31 to 31.9	1.10	1.07	.86	.85½	.90½	.77½	1.10	.96	.82	1.21
32 to 32.9	1 15	1.12	.89	.90½	.95½	.82½	1 15	1 01	.84	1.24
33 to 33.9	1.18½	1.17	.92	.95½	1.00½	.87½	1.18½	....	.86	1.27
34 to 34.9	1.22	1.22	.95	1 00½	1 05½	.92½	1.22	..	.88	1.30
35 to 35.9	1.25½	1.25½	.98	1 04	1.09	.96	1.25½	....	.90	1.33
36 to 36.9	1.29	1 29	1.01	1.07½	1.12½	.99½	1 29	..	.92	1.36
37 to 37.9	1.32½	1.32½	....	1.11	1 16	1.03	1.32½	..	...	1.39
38 to 38.9	1.36	1.36	....	1.14½	1.19½	1.06½	....	....	....	1.42
39 to 39.9	1.39½	1.39½	....	1.18	1 23	1.10	...	..	....	1.44
40 to 40.9	1.43	1.43	....	1.21½	1.26½	1.13½	..	..	....	1 46
41 to 41.9	1.46½	1.46½	....	1.25	1 30	1.17	..	..	....	1.45
42 to 42.9	1 50	1.50	....	1.28½	1.33½	1 20½	..	..	....	1.50
43 to 43.9	1.53½	1.53½	....	1.32	1.37	1.24	....	....	....	1.53
44 and above	1.57	1.57	....	1.35½	1.40½	1.27½	....	....	....	1.54

Column 1, Note—Above prices posted April 10, 1930, by Carter Oil Co. (beginning at 25° and below), and by the Prairie Oil & Gas Co. and other purchasers beginning at 24° and below, the Magnolia Petroleum alone excepted. The Magnolia on April 10 posted the following prices: Below 26 gravity, 70 cents; 26-26.9, 76 cents; 27-27.9, 82 cents; 28-28.9, 88 cents; 29-29.9, 95 cents; 30-30.9, $1.02. From 31 and up and including 44° and above Magnolia followed Carter price schedule, but made its whole schedule apply to its gravity purchases in Kansas, Oklahoma and North Central Texas alike.

Column 2—Humble Oil & Refining Co. posted above prices April 10, 1930, and was followed by all other companies in Texas except Magnolia which posted a different price schedule than Humble up to 33.9°. (See note in paragraph just above.) The Texas Company posted North Louisiana and Arkansas on April 10, and Standard of Louisiana posted on April 11, followed by other companies, but Magnolia's price schedule begins with below 28 gravity at 87 cents. North Central Texas includes North Texas, Ranger, Mexia, Powell, Richland, Wortham, Lytton Springs, Currie, Nocona, Moran and Corsicana light. Arkansas and Louisiana pools include Caddo, Bull Bayou, Crichton, Cotton Valley (above 36 gravity), DeSoto, Haynesville, Homer, El Dorado and Rainbow.

Column 3—Posted by Humble Oil & Refining Co. April 10, 1930, and Magnolia Petroleum Co. April 10, 1930.

Columns 4, 5 and 6—Humble Oil & Refining Co., Prairie Oil & Gas Co., Magnolia Petroleum Co., April 10, 1930.

Column 7—Midwest Refining Co., April 11. All crude over 37 gravity, $1.32½.

Column 8—Louisiana Oil & Refining Co., April 11.

Column 10—Humble Oil & Refining Co., April 10. Magnolia Petroleum Co. posted below 25 gravity, 65 cents, with 3-cent differential upward to and including 36 and above which was posted at $1.01.

CALIFORNIA CRUDE OIL PRICES

Standard Oil Co. (effective September 15, 1930). Union Oil Co. (effective September 15, 1930).

Gravity—	1 Long Beach, Seal Beach, Alamitos Hts., Huntington Beach, Inglewood, Torrance, Richfield, Olinda Brea Canyon	2 Whittier, La Habra, Coyote Hills	3 Midway-Sunset Elk Hills, Lost Hills, Belridge, Buena Vista Hills	4 Montebello	5 Santa Fe Springs	6 Santa Maria Coalinga	7 Wheeler Ridge	8 Orcutt, Ventura, Rincon	9 Ventura Avenue	10 Elwood Terrace	11 Athens, Rosecrans, Dominguez
14 to 14.9	.70	.70	.55	.70	....	.55	.55	.55	.70	....	....
15 to 15.9	.70	.70	.55	.70	....	.55	.55	.55	.70	....	....
16 to 16.9	.70	.70	.55	.70	....	.55	.55	.55	.70	....	....
17 to 17.9	.70	.70	.55	.70	....	.55	.55	.55	.70	....	....
18 to 18.9	.76	.76	.62	.71	....	.62	.62	.65	.76	....	....
19 to 19.9	.82	.82	.70	.77	....	.70	.70	.70	.82	....	....
20 to 20.9	.88	.87	.78	.83	....	.78	.78	.78	.88	....	....
21 to 21.9	.94	.93	.86	.90	.92	.86	.86	.90	.91	....	....
22 to 22.9	1.00	.98	.94	.97	.95	.94	.94	.95	.94	....	....
23 to 23.9	1.07	1.04	1.02	1.05	1.01	1.02	1.02	1.02	1.00	....	....
24 to 24.9	1.12	1.08	1.06	1.08	1.05	1.04	1.04	1 08	1.05	....	1.12
25 to 25.9	1.17	1.12	1.10	1.11	1.09	1 06	1.06	1.11	1 10	....	1.17
26 to 26.9	1 22	1.16	1 14	1.15	1 13	1.08	1.08	1.15	1.15	....	1 22
27 to 27.9	1.26	1.21	1.18	1.19	1.18	1.11	1.10	....	1.19	....	1.27
28 to 28.9	1.30	1.25	1.23	1.23	1.23	1.15	....	....	1.23	....	1.32
29 to 29.9	1 34	1.29	1.26	1.28	1 19	....	....	....	1.27	....	1.37
30 to 30.9	1.38	1.33	1.35	1.29	1 33	1 23	....	....	1.31	....	1.42
31 to 31.9	1.43	....	1.40	....	1.38	1 27	....	....	1.36	....	1.47
32 to 32.9	1.48	....	1 47	....	1.43	1.31	....	....	1.41	....	1.52
33 to 33.9	....	....	1.53	....	1 48	1.35	....	....	1 47	....	1.57
34 to 34.9	....	....	1.59	....	1.53	1 39	....	....	1.53	1.32	1 62
35 to 35.9	....	....	1.65	....	1 58	1.43	....	....	1.59	1.39	1 66
36 to 36.9	....	....	....	....	1.63	....	....	....	....	1.46	1 72
37 to 37.9	....	....	....	....	1.68	....	....	....	....	1.53	1.78
38 to 38.9	....	....	....	....	1.73	....	....	....	....	1.60	1 84
39 to 39.9	....	....	....	....	1.78	....	....	....	....	1.66	1.90
40 to 40.9	....	....	....	....	....	....	....	....	....	1.72	1.96
41 to 41.9	....	....	....	....	....	....	....	....	....	1.78	2.02
42 to 42.9	....	....	....	....	....	....	....	....	....	1 84	2.08

Kern River, Newhall-McKittrick, Mount Poso and Round Mountain, 11 to 13.9 gravity, 50 cents; 14 gravity and above, 55 cents, effective March 11. On March 11, the Union Oil Co. posted Midway-Sunset, Elk Hills, Buena Vista, Lost Hills and Coalinga Crude as follows: 11 to 13.9 gravity at 50 cents. Fruitvale, posted by General Petroleum Co., 11-13.9, 50 cents; 14 gravity and above, 55 cents.

Column 1—Signal Hill, Seal Beach, Huntington Beach and Alamitos Heights crude, 14 to 32.9 gravity, inclusive; Richfield, Olinda-Brea and Fullerton, 14 to 30.9 gravity; Torrance and Inglewood, 14 to 28.9 gravity.

Column 2—Whittier crude, 14 to 22.9 gravity; Coyote Hills, 14 to 30.9 gravity.

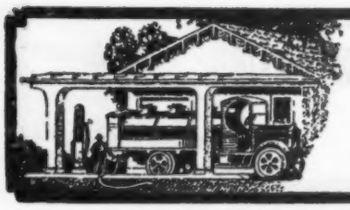
Column 3—Kern River, Newhall and McKittrick, 11 to 19.9 gravity; Midway-Sunset, Buena Vista and Elk Hills, 11 to 33.9 gravity; Lost Hills, 11 to 34.9 gravity; oil below 14 gravity posted at 50 cents.

Column 5—Price change posted by Standard of California September 16.

Column 6—Oil below 14 gravity posted at 45 cents.

Column 8—Posted by General Petroleum Co.

Kettleman Hills—Union Oil Co., September 22, 35 to 39 gravity, $1.10; 40 to 44 gravity, $1.20; 45 to 49 gravity, $1.35; 50 to 54 gravity, $1.50; 55 gravity and above, $1.65. Standard Oil Co. of California, 55 gravity and above, $1.65.



TANK WAGON MARKETS

Tank wagon quotations for gasoline and kerosene in United States as furnished by the larger marketing concerns Sept. 30

ALL TANK WAGON AND SERVICE STATION QUOTATIONS INCLUDE TAXES

STANDARD OIL CO. (INDIANA)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax of	tank wagon
Chicago†	16.0	17.0	3.0	11.0
Decatur, Ill.	16.2	17.2	3.0	11.1
E. St. Louis	17.4	18.4	3.0	10.2
Joliet	16.4	17.4	3.0	10.2
Peoria	16.2	16.0	3.0	11.3
Quincy	16.2	17.2	3.0	10.9
Davenport, Ia.	16.5	17.5	3.0	11.3
Des Moines	15.5	16.5	3.0	11.3
Keokuk	16.5	17.5	3.0	11.3
Sioux City	16.1	17.1	3.0	10.9
Duluth, Minn.	17.5	18.5	3.0	11.9
Mankato	17.1	15.0	3.0	11.7
Minneapolis	16.0	18.0	3.0	11.9
La Crosse, Wis.	16.2	17.2	2.0	12.0
Milwaukee	17.1	16.0	2.0	10.9
Madison	15 3	16.3	2.0	11.1
Detroit, Mich.	16.8	14.3	3.0	12.7
Grand Rapids	18.7	16.7	3.0	12.6
Saginaw	18.9	16.9	3.0	12.8
Evansville, Ind.	19.0	15.0	4.0	12 0
Indianapolis	17.9	17.2	4.0	12.2
South Bend	17.4	18.4	4.0	12.4
Fargo, N. D.	20.9	21.9	3 0	13.9
Huron, S. D.	20.3	17.5	4.0	12.7
Sioux Falls	17.1	18.1	4.0	12.4
K. C. Mo.	15 9	16.9	3.0	9.6
Springfield*	17.8	18.8	3.0	10.5
St. Louis*	14.9	15.9	2.5	10.3
St. Joseph	15.5	16.5	2.0	10.2
Wichita, Kans.	16.8	14.8	3.0	9.8
Bartlesville, Ok.	16.5	18.5	4.0	9.5

*State tax 2 cents; remainder city tax.

†Effective June 3, discounts on Q.D.A. in Chicago district 4 cents off service station price on purchases of 500 gallons or more per month and 5 cents on purchases of 1,000 gallons or more per month.

Effective August 5, the following quantity discounts from the service station prices are allowed on monthly sales of gasoline; 500 gallons or more, 3 cents; 75,000 gallons or more, 4½ cents. Discounts are allowed each month and they are not cumulative. Delivery tickets showing date and quantity delivered must be sent to the seller before the tenth of the month to secure the discount on the previous month's purchases.

ROCKY MOUNTAIN DISTRICT

Continental Oil Co.

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax of	tank wagon
Denver, Colo.	16.0	19.0	4.0	15.5
Pueblo	17.0	20.0	4.0	15.5
Grand Junction	21.5	24.5	4.0	19.0
Casper, Wyo.	19.0	22.0	4.0	14 0
Cheyenne	18.5	21.5	4.0	15.5
Butte, Mont.	24.5	23.0	5.0	20.0
Billings	20.0	23.0	5.0	18.5
Great Falls	23 0	23.0	5.0	20.0
Helena	24.5	27.5	5.0	20.0
Salt Lake, Utah	20.0	23.0	3.5	17.0
Albu'que, N. M.	16.0	20.0	5.0	15.0
Boise, Idaho	23.5	26.5	5.0	19 0
Twin Falls	23.5	27.5	5.0	19.0

SOUTHWESTERN DISTRICT

Magnolia Petroleum Co.

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax of	tank wagon
Dallas, Tex.	14.0	17 0	4.0	12.0
Fort Worth	14.0	17.0	4.0	11.0
Houston	15.0	19.0	4.0	11.0
San Antonio	13.0	17.0	4.0	11.0
El Paso	16.0	20.0	4 0	13.0
Texarkana	17.0	17.0	4.0	12.0
Muskogee*	15.0	18.0	4.0	9.0
Okla. City*	15.0	18.0	4.0	10.0
Tulsa	15.0	18.0	4.0	10.0
Ft. Smith, Ark.	15.5	17.5	5.0	12.0
Little Rock	16.5	18.5	5.0	13.0

*Gasoline tank wagon price to dealers 1 cent under posted tank wagon.

One-cent rebate made from posted station prices to cash purchasers in Louisiana, Arkansas and Tennessee.

NEBRASKA

Standard Oil Co. (Nebraska)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax of	tank wagon
Omaha	17.25	18.25	4.0	11.25
McCook	18.75	20.75	4.0	12.75
Norfolk	17.25	17.25	4.0	11.75
N. Platte	18 75	20.75	4.0	12.50
Scott's Bluff	17.00	17.00	4.0	12.25

OHIO

Standard Oil Co. (Ohio)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax of	tank wagon
Ohio points*	18.0	19.0	4.0	†15.0

*Dealers and commercial accounts 2 cents under tank wagon.

†Service station price 16 cents.

CENTRAL SOUTH DISTRICT

Standard Oil Co. (Louisiana)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax of	tank wagon
N. Orleans, La.*	16.5	18.5	5.0	11.5
Baton Rouge	15.5	17.5	4.0	13.0
Alexandria†	17.5	19 0	5.0	13.0
Lafayette*	17.5	19.5	5.0	13.0
Lake Charles*.	17.5	19.5	5.0	13.0
Shreveport	15.5	17.5	4.0	13 0
Knoxv'le, Tenn.	20.0	22.0	5.0	15.0
Memphis	18.0	20.0	5 0	12.5
Chattanooga	19.5	21.5	5.0	13.0
Nashville	19.0	21.0	5.0	15.0
Bristol	20.0	22.0	5.0	14.0
Lt. Rock, Ark.	17.5	19.5	5.0	12.0

*Includes city tax of 1 cent. Louisiana kerosene prices include 1-cent state tax. New Orleans kerosene price also includes 1-cent city tax.

†Gasoline price at Alexandria includes 1-cent tax in parish of Rapides.

PENNSYLVANIA—DELAWARE AND PART NEW ENGLAND

The Atlantic Refining Co.

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax of	tank wagon
Pittsburgh, Pa.	16.0	*21.0	...	13 0
Philadelphia	16.0	*21.0	...	13.0
Scranton	16.0	*21.0	...	13.0
Allentown	16.0	*21.0	...	13.0
Altoona	16.0	*21.0	...	13.0
Erie	15.0	*19 0	...	13.0
Dover, Del.	19.0	21.0	3.0	13.0
Wilmington	19.0	21.0	3.0	13.0
Springf'd, Mass.	17.5	19.5	2.0	12.5
Worcester	17.3	19.3	2.0	12.3
Boston	16.5	18.5	2.0	11.5
Providence, R.I.	16.7	18.7	2.0	11.7
Hartford, Conn.	17.5	19.5	2.0	12.5
New Haven	17.6	19.6	2.0	12.6

*Includes tax of 3 cents. Pennsylvania tax is collected by the dealer and paid by him direct to the State. The Atlantic Refining Co. recognizes a 2-cent per gallon discount on gasoline from its posted tank wagon markets on sales to dealers for purposes of resale. The Atlantic Refining Co. also recognizes a maximum discount of 2 cents per gallon on gasoline to commercial accounts under contract for one year.

PACIFIC COAST TERRITORY

Standard Oil Co. (California)

	Gasoline			Kero.
	Wholesale price	Retail price	Incl'ds tax of	tank wagon
Fresno	22.0	21.0	3.0	17.0
San Francisco	23.0	21.0	3.0	16.5
Los Angeles	22.5	20.5	3.0	15.5
Reno, Nev.	28.0	26 0	4.0	19.0
Portland, Ore.	24.5	22.5	4.0	16.5
Seattle, Wash.	23.5	21.5	3.0	16.5
Tacoma	23.5	21.5	3.0	16.5
Spokane	27.5	25.0	3 0	20.5
Phoenix, Ariz.	17.0	20.0	4.0	20.0

Above prices are at company's plant or depots as company does not operate stations. A 6-cent per gallon discount is given dealers and customers taking tank wagon lots except in Phoenix where the discount is 1 cent.

NEW YORK AND PART OF NEW ENGLAND DISTRICT

Standard Oil Co. (New York)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax of	tank wagon
Albany, N. Y.	18.6	17.6	2.0	15 6
New York*	16.3	18.3	2.0	14.3
Buffalo	17.8	19.8	2.0	14.8
Rochester	18.0	20.0	2.0	14.0
Syracuse	18 8	20.8	2.0	14.8
Boston, Mass.	16.5	18.5	2.0	13.5
Augusta, Me.	19.8	21.8	4.0	14.8
Manch't'r, N.H.	19.4	21.4	4.0	14.0
Burlington, Vt.	19.6	21.6	4.0	15.3

*Prices in steel barrels.

STANOLIND FURNACE OIL IN CHICAGO

Less than 100 gallons	9 0
100 to 349 gallons	8.0
350 gallons or more	7.5

Note—Outside Chicago furnace oil discount of 1 cent per gallon is given on deliveries of 100 to 349 gallons and 1½ cents on deliveries of 350 gallons or more.

NAPHTHA

	Tank wagon	Tank car
Oleum spirits	14.7	10.0
V. M. & P. naphtha	16.7	12.0
Cleaner's naphtha	17.0	14.9
Stanisol	17.0	15.4

Tank wagon prices f.o.b. Chicago; tank car prices f.o.b. Whiting.

ATLANTIC COAST DISTRICT

Standard Oil Co. (New Jersey)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax of	tank wagon
Atlantic City	14.5	16.5	2.0	11 5
Newark, N. J.	13.5	15.5	2.0	10.5
Annapolis	16.0	18.0	4.0	11.0
Baltimore	16.2	17.2	4.0	10.2
Cumberland	17.0	19.0	4.0	12.0
Wash'gton, D.C.	13.7	15.7	2.0	10.7
Danville, Va.	17.8	19.8	5.0	11.8
Norfolk	16.3	18.3	5.0	10.3
Petersburg	17.3	19.3	5.0	11.3
Roanoke	18.0	20.0	5 0	12.0
Richmond	16.7	18.7	5.0	10.7
Charles'n, W.Va.	16.5	18.5	4.0	11.5
Keyser	17.1	19.1	4.0	12.0
Parkersburg	15.2	17.2	4.0	10.2
Wheeling	16.4	18.4	4.0	11.4
Charlotte, N. C.	18.3	20.3	5.0	12.3
Hickory	18.6	20.6	5.0	12.6
Mt. Airy	18.5	20.5	5.0	12.5
Salisbury	18.5	20.5	5.0	12.5
Charleston, S.C.	17.3	19.3	6.0	10.3
Columbia	19.2	21.3	6.0	12.3

A 2-cent per gallon discount off the gasoline tank wagon price is offered to dealers.

SOUTHERN DISTRICT

Standard Oil Co. (Kentucky)

	Gasoline			Kero.
	Tank wagon	Service station	Incl'ds tax of	tank wagon
Atlanta, Ga.	19.0	21.0	6.0	14.5
Augusta	22.0	24.0	6.0	15.5
Macon	20.0	22.0	6.0	13.0
Savannah	20.0	22.0	6.0	14.0
Birm'ham, Ala.	18.0	20.0	5.0	14.5
Mobile	19.0	19.0	4.0	11.5
Montgomery	20.0	22.0	4.0	15.0
Clarks'le, Miss.	19.0	21.0	5.0	12 5
Jackson	17.0	19.0	5.0	13.0
Natchez	19.0	21.0	5.0	13.0
Gulfport	20.5	22.5	5.0	12.0
Vicksburg	19.0	21.0	5 0	13.0
Jack-ville, Fla.	19.0	21.0	6.0	14.0
Miami	21.0	23.0	6.0	14.0
Pensacola	20.0	21.0	6.0	13.5
Tampa	20.0	20.0	5 0	13.0
Lexington, Ky.	19.0	20.0	5.0	14.5
Covington	19.0	21.0	5.0	14.5
Louisville	18.0	20.0	5.0	13.5
Ashland	18.0	20 0	5.0	15.0
Catlettsburg	18.0	20.0	5.0	15.0

In addition to the state tax of 4 cents on gasoline, Montgomery has city tax of 1 cent on gasoline and one-half on kerosene. Kerosene prices in Georgia include 1-cent tax. In Florida, an inspection fee of 0.125 cent; in Alabama, an inspection fee of one-half cent on kerosene and one-fourth cent on gasoline. To Pensacola, Montgomery, Birmingham and Mobile state taxes add 1-cent levy tax. To Gulfport state tax add privilege tax of 2 cents.

Effective April 2, price to dealers 2 cents under posted tank wagon price.

TANK WAGON CHANGES

Standard Oil Co. of Indiana reduced the gasoline and kerosene tank wagon and station prices 2 cents throughout its entire territory except at those points where these prices are already below normal. This reduction became effective September 29.

Continental Oil Co. reduced the gasoline tank wagon and station prices 2 cents in Cheyenne, Wyo., to 18½ and 21½ cents, September 23.

Standard Oil Co. of Kentucky advanced the gasoline tank wagon and station prices September 22 to 19 cents each in Mobile, Ala., to 18 cents and 20 cents in Birmingham, to 20 cents and 22 cents in Montgomery and 20 and 22 cents in Savannah, Ga. On September 23 the gasoline tank wagon and station prices were reduced to 19 cents and 21 cents in Covington. On the same date the kerosene tank wagon price was reduced to 11½ cents in Mobile, Ala.

Standard Oil Co. of Louisiana advanced the gasoline tank wagon and station prices 1 to 2 cents throughout the greater portion of its territory. The new prices are shown in tabular form here.

Magnolia Petroleum Co. advanced the gasoline tank wagon and station prices September 25 to 15½ and 17½ cents in Fort Smith, Ark., and to 16½ and 17½ cents in Little Rock, Ark.

Standard Oil Co. of Nebraska reduced the gasoline and kerosene tank wagon and station prices throughout the State 2 cents except in those points where they were already below normal. The change was made effective September 29.

Magnolia Petroleum Co. reduced the gasoline tank wagon and station prices in Oklahoma, making the tank wagon prices 15 cents and the station price 18 cents at all points.

CRUDE OIL PRICES

(Continued from Page 355)

Elk Basin	1.55
Lance Creek	1.42
Poison Spider (March 14, 1927)	1.06
Notches (March 14, 1927)	.81
Rex Lake (February 22)	1.10
Osage	1.61
Lost Soldier (contract, May 22)	1.06
Hamilton Dome (March 14, 1927)	.81
Greybull (April 11, 1930)	1.55
Four Bear (May 31, 1929)	.81
Cat Creek	1.55
Pondera (Montana) (April 10, 1930)	1.51
Sunburst (Montana) (Feb. 15, 1930)	1.61
Hogback (Feb. 15, 1930)	1.40
Artesia (New Mexico)	1.46
Lea County	See gravity table

Note—Salt Creek, Osage, Cat Creek, Greybull and Hogback posted by Midwest Refining Co., and the remainder by the Ohio Oil Co. Both companies posted Grass Creek light and Elk Basin.

SOUTH CENTRAL AND SOUTHWEST TEXAS

Darst Creek (April 10, 1930)*	$1.11
Luling (April 10, 1930)	.81
Mirando (April 10, 1930)†	.81
Pettus (Aug. 21, 1930)§	1.11
Salt Flat (April 10, 1930)§	1.11
Thrall‡	...
Lytton Springs (Lockhart)	See gravity table
Somerset (April 10, 1930):	
Below 33 gravity	$1.15
33 to 33.9 gravity	1.17
34 to 34.9 gravity	1.19
35 to 35.9 gravity	1.21
36 to 36.9 gravity	1.25
37 to 37.9 gravity	1.25
38 gravity and above	1.27

*Posted by Humble Oil & Refining Co. and Magnolia Petroleum Co. †Magnolia Petroleum Co., Humble Oil & Refining Co., Crown Central Pipe Line Co. ‡Thrall prices same as North Central Texas less 19½ cents per cwt. freight. §Humble Oil & Refining Co.

EASTERN STATES

Joseph Seep Purchasing Agency

(Effective August 22, 1930)

Seep Purchasing Agency withdrew from Bradford and Allegany Fields as a purchaser on May 16.

Penna. Grade Oil in National Transit Lines (Pennsylvania)	$2.30
Penna. Grade Oil in Southwest Pennsylvania Lines (Pennsylvania)	2.25
Penna. Grade Oil in Eureka Pipe Line Lines (West Virginia)	2.15
Penna. Grade Oil in Buckeye Pipe Line Lines (Ohio) (Sept. 14, 1930)	1.90
Corning Grade Oil in Buckeye Pipe Line Co.'s Lines (Aug. 1, 1930)	1.60
Somerset Oil in Eureka Pipe Line Lines (Kentucky) (August 1, 1930)	1.35
Ragland Grade Oil in Cumberland Pipe Lines (Kentucky) (August 1, 1930)	1.30
Wayne District Oil in Cumberland Pipe Lines (April 11, 1930)	1.35

Tide Water Pipe Co.

Bradford district (Aug. 22)	$2.50
Allegany district (Aug. 22)	2.50

Pure Oil Co.

Cabin Creek, W. Va. (Aug. 22)	$2.40
Kelly Creek, W. Va. (Aug. 22)	2.25
Bradford Hollow, W. Va. (Aug. 22)	2.25

MIDDLE WESTERN STATES

Ohio Oil Co.

(Effective April 11, 1930)

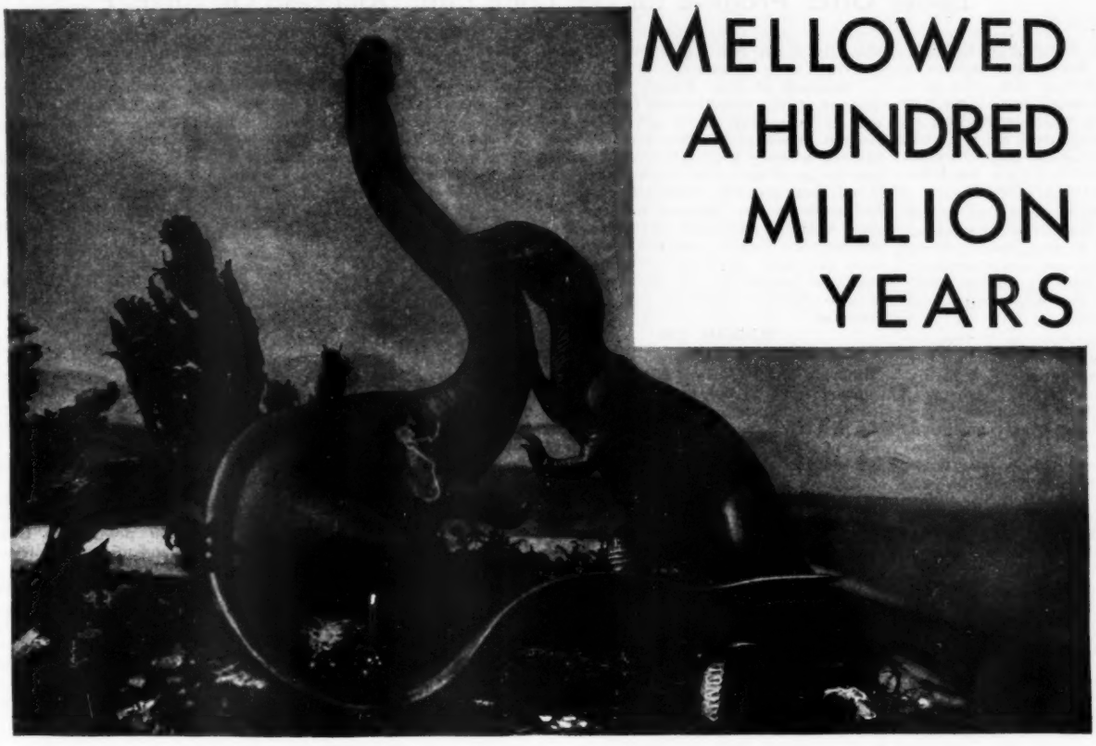
Lima (June 26, 1930)	$1.60
Wooster (June 26, 1930)	1.70
Illinois	1.65
Indiana (June 26, 1930)	1.32
Princeton	1.65
Plymouth	1.23
Western Kentucky	1.55
Midland, Mich.* (Aug. 21)	1.30
Dundee, Mich. (April 16)‖	....Same as Mid-Continent gravity scale
Upper and Lower Traverse Sands, Mich. (April 16)‖	....Same as Mid-Continent gravity scale
Saginaw, Mich. (April 11)†	... Same as Mid-Continent gravity scale
Cumberland, Clay, Barren, Clinton and Monroe Counties, Kentucky (March 15)‡	1.50
Oil City, Ky. (July 25, 1930)‖	1.35
Oil Springs (Canada) (June 28, 1930)¶	2.02
Petrolia (Canada) (June 23, 1930)¶	1.95

*Posted by Pure Oil Co. †Posted by Sun Oil Co. ‡Posted by Paragon Development Co. §Posted by Stoll Oil Refining Co. ‖Posted by Imperial Oil Co., Ltd. ¶Posted by Standard of Indiana for boat shipment. Local refiners posted Mid-Continent prices on April 11.

MEXICAN CRUDE

Panuco*	$0.53

*F.o.b. ship, based on August transactions



MELLOWED A HUNDRED MILLION YEARS

While scaly monsters fought in PENNSYLVANIA

Here's another of the photographs that illustrate the most sensational advertising campaign ever put behind a motor oil. Look for this striking series on Sinclair Mobiline in the national magazines, newspapers and rotogravure pages of Sunday newspapers in your section.

Get ready to supply the demand for Mobiline—the finest Pennsylvania grade oil of them all. We'll furnish you with colorful banners, pennants and posters that are bound to get attention and bring business to your station.

On the Radio—Sinclair is on the air in a nation-wide hook-up Monday and Friday evening. Tune in and get your share of fun out of Phil Baker, Shaw and Lee—internationally famous comedians in the Sinclair laugh-hit "GOING PLACES".

Here are three new business-getting salesmen for every Sinclair dealer!

Sinclair Refining Company (Inc.), New York, Atlanta, Chicago, Houston, Fort Worth, Kansas City. Sinclair Refining Company of Canada, Ltd., Toronto. Sinclair Refining Company of California, Los Angeles.

SINCLAIR MOBILINE

Reg. U. S. Pat. Off. 1905

Pennsylvania MOTOR OIL

Made in the newest, largest single refinery using PENNSYLVANIA grade crude exclusively.

Guaranteed by SINCLAIR REFINING CO. INC. to be 100% pure PENNSYLVANIA GRADE OIL

35¢ *per quart*

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Wall Street View on Oil Securities

Standard of New York Firm on Investment Buying. Petroleum Issues Offer Promise for the Long Pull. Richfield Oil Change

Standard Oil Co. of New York has been firm recently on investment buying at around 89. The stock at this price, says the Wall Street Journal, is yielding better than 5 per cent, which is regarded as an exceptionally high yield for a Standard Oil issue. Early in the year the company sold its Magnolia natural gas holdings for approximately $47,500,000.

"Socony," despite the fact that it had to meet new and intensified competition in various parts of its marketing territory in the United States, and was affected by drastic cutting of prices in the Far East, reported for 1929 the largest operating income in its history.

Merger of the company with Vacuum Oil Co., another unit of the Standard Oil group, would be advantageous, bringing together two complementary businesses. This would strengthen the company's position and aid it in meeting competition from well integrated units in foreign fields. Referee appointed to take testimony in the proposed merger of the two companies recently submitted his report to the court and final arguments are to be submitted to the court early in October, though decision in the case is not expected until after the first of the year.

"Oil stocks now are selling at or very near their extreme low points, both for this year and last year," says Winthrop, Mitchell & Co. "While for seasonal reasons they are not expected to figure in any sharp advance at this time, they nevertheless offer considerable promise for the pull. Improvement within the industry appears to have been greater than generally recognized. Gasoline refining has been curtailed more than 10 per cent from the levels attained this time last year. Despite dullness in business the past summer, consumption of gasoline in 1930 may show an even greater increase than the 5 per cent figure estimated by the trade early in January.

"Standard of New Jersey, California, Indiana, Gulf, Sinclair and Continental are six companies which are especially favored. Standard of New Jersey's new process, whereby a greater proportion of gasoline or of heavy oil can be extracted at will from supplies of crude, is expected by people in the business to prove of great value in regulating and controlling production. Under previous methods, there had been an almost constant oversupply of heavier oils, but this condition, it is confidently expected, will now be remedied."

Richfield Oil

Stockholders of Richfield Oil Co. of California have approved change in the common stock to no-par from $25. The Richfield company recently applied to the New York Stock Exchange to list a total of 2,891,735 shares of the new no-par common stock, or the same number of $25 par shares previously authorized by the exchange for issuance. Authorized common shares under the company's charter amount to 5,000,000.

At December 31, 1929, the company had outstanding, in addition to 399,900 shares of $25 par 7 per cent preferred stock, 1,947,241 shares of $25 par common. On January 28, this year, directors authorized the issuance of 100,000 additional common shares, which were underwritten by bankers at not less than par value, and on March 5 authorized issuance of 20,167 shares as part consideration in acquisition of Universal Consolidated Oil Co. At the close of June there were 2,060,242 common shares outstanding.

On July 10 the California Corporation Commission authorized the sale of 250,000 additional common shares at not less than $17 a share, the company stating in its application for the listing on Los Angeles Stock Exchange that 2,117,901 shares were outstanding. Early in September arrangements were made by which 400,000 shares of additional common were placed under option at $17 a share to a banking group headed by James C. Willson & Co. of New York.

Houston Oil

Houston Oil Co. of Texas expects that the new $25 par shares of common stock, issuable on a four-for-one basis in exchange for present $100 par stock, will be ready for delivery on and after October 17 and that the stock dividend of 10 per cent on the common stock will be payable at the same time. Issuance of the reduced par value shares and payment of the stock dividend have been delayed until the definitive certificates could be prepared and arrangements made to list the new certificates on the New York Stock Exchange.

Twenty Representative Stocks

The Oil and Gas Journal's weekly average price of 20 representative petroleum stocks listed on the New York Stock Exchange and New York Curb, based on closing quotations for Wednesday, was as follows:

Apr. 16	52.04	July 9	44.11
Apr. 23	53.39	July 16	46.42
Apr. 30	53.70	July 23	46.06
May 7	50.23	July 30	44.89
May 14	51.67	Aug. 6	45.24
May 21	49.71	Aug. 13	43.53
May 28	50.98	Aug. 20	43.79
June 4	50.94	Aug. 27	42.82
June 11	46.65	Sept. 3	42.71
June 18	41.41	Sept. 10	42.84
June 25	42.37	Sept. 17	42.43
July 2	44.13	Sept. 24	40.62

Paragon Refining

Formal dissolution of the Paragon Refining Co. was effected at a special meeting. E. W. Edwards, president, said the properties had been turned over to the Gulf Oil Corp., the purchaser, on September 1, and that the only remaining duties of the officers of Paragon were to settle claims and collect remaining accounts receivable.

Eureka Pipe Line

Eureka Pipe Line declared regular quarterly dividend of $1, payable November 1 to stock of record October 15.

Barnsdall Oil

Net earnings of the Barnsdall Corp., after all charges, including federal taxes, for the first eight months were sufficient to cover the full year's dividend requirements of $2 a share.

PETROLEUM FACTS AND FIGURES

"Petroleum Facts and Figures," yearbook of the petroleum industry, has been published in its third edition (232 pages) by the American Petroleum Institute. New material appears, including chapters explanatory of the nature and uses of petroleum, and history and activities of the industry. There are chapters also on production, transportation, refining and utilization of various products, taxation of gasoline, highways, aviation, lubricating oils, asphalts and other subjects.

The statistical information and tables, features of the earlier editions, have been revised to date. The chronology of conservation has been continued. The National Code of Practices for Marketing Refined Petroleum Products appears in full with interpretations. The fourth report of the Federal Oil Conservation Board also is presented in full.

The price of the volume, $2, remains unchanged. Copies may be obtained from the American Petroleum Institute, 250 Park Avenue, New York.

INDEPENDENT OILS ON NEW YORK CURB

Quotations Compiled by Francis, Bro. & Co., Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

1930 High	1930 Low	Week ended September 24 Sales	High	Low	Close	Stocks		Outstanding capital	Par value	Div. rate	Last paid	1927 High	1927 Low	1928 High	1928 Low	1929 High	1929 Low
⅜	⅛	700	⅛	⅛	⅛	American Consolidated Oilfields		$11,018,000	$5	....	.....	2 7/16	.55	1½	.53	72c	⅛
4½	1½	500	1¾	1¾	1¾	American Maracaibo	(sh)	700,000	N.P.	....	.....	7½	2¾	9½	3½	8⅝	1⅛
1⅜	1	300	1⅛	1⅛	1⅛	Argo Oil	(sh)	683,971	$10	....	.....	2¾	1	4½	2¼	5	1½
21	17	100	17	17	17	British American		1,311,321	N.P.	25cQ*	7- 2-30	40	20½	55	32¾	62	7¾
2¾	⅝	800	1⅝	1⅛	1⅛	Caribbean Syndicate		$131,250	25c	....	.....	28¼	15½	4½	3⅞	4⅞	1
44¼	24⅛	41,400	27⅞	27⅛	27⅝	Cities Service	(sh)	24,290,359	N.P.	30cA†	9- 1-30	58¾	40¼	90⅞	54	68⅛	20
93⅞	88	400	91⅝	91⅛	91⅝	Cities Service pfd.	(sh)	1,500,000	N.P.	50cM	9- 1-30	95⅝	87	103½	94½	98¾	84
¾	¼	700	¼	¼	¼	Colombia Syndicate		$2,000,000	$1	....	.....	3⅞	1⅛	3¼	.76	2	½
3⅞	3½	300	3¾	3½	3½	Consolidated Royalty		$5,000,000	$10	12½cQ	7-25-30	9¾	6⅜	8⅞	6¼	11⅛	2½
7⅝	5¼	1,200	5½	5½	5½	Creole Petroleum	(sh)	5,977,873	N.P.	....	.....	14⅞	9½	17½	9½	11¾	5⅝
1	¼	400	¼	¼	¼	Crown Central	(sh)	587,000	N.P.	....	.....	3	.50	3¼	.76	2½	¼
21¾	8⅝	500	10	10	10	Darby Petroleum (new)		1,019,392	N.P.	50cQ	7-15-30	12	4	33½	3¼	26	6½
11	4½	300	6½	6½	6½	Derby Oil & Refining	(sh)	500,000	N.P.	....	.....	2½	74	2¼	1	11	2
60	30	25	50	50	50	Derby Oil & Refining pfd.		48,500	N.P.	....	.....	16¾	4	21⅛	7½	44	20⅜
166⅞	113⅛	2,700	116¾	113⅛	113⅛	Gulf Oil Corp.	(sh)	4,504,921	$25	37½cQ	7- 1-30	118	86¼	165	101⅛	209	115
1¾	⅝	600	⅝	⅝	⅝	Intercontinental Petroleum (new)		$5,682,000	$5	....	.....	2½	.80	3⅜	1	2⅞	⅜
3	1½	100	1½	1½	1½	Kirby Petroleum	(sh)	750,000	N.P.	....	.....	2¼	1⅛	3	1¼	3⅝	1¼
1⅝	1⅛	100	1¼	1¼	1¼	Leonard Oil & Development		$50,000,000	$25	....	.....	10⅞	5⅛	9⅜	5⅛	6¼	1
20	17	300	18	17½	17½	Lion Oil & Refining	(sh)	250,000	N.P.	50cQ	7-28-30	27½	20	43⅞	20	38⅞	18
55⅞	34½	400	37	36½	36½	Lone Star Gas (new)	(sh)	5,000,000	N.P.	25cQ	6-30-30	59⅝	37	69½	48½	67⅞	28
½	⅛	200	⅛	⅛	⅛	Magdalena Syndicate	(sh)	850,000	$1	....	.....	2⅞	.80	1⅞	.50	1¼	¼
16	12	100	12½	12½	12½	Margay Oils		160,000	N.P.	25cQ	7-10-30	52	12	48½	32	38½	14
7½	2	2,600	4½	2⅝	3⅛	Mexico-Ohio Oil		.....	...	....	.....	12⅛	5	8	2¾	6⅜	2½
⅜	⅜	100	½	½	½	Mountain & Gulf		$4,000,000	$1	2cQ	7-15-30	1½	1	1⅜	.76	1½	¼
12⅛	8	200	9	9	9	Mountain Producers		$1,682,182	$10	40cQ	7- 1-30	29¼	22⅜	28⅞	19½	22⅞	7
3½	2¼	400	2⅝	2½	2⅝	New Bradford Oil		$1,095,291	$5	12½cQ	7-15-30	5⅞	4⅝	5⅝	4¼	5	2½
7¼	3⅛	100	4	3⅝	4	New Mexico & Arizona		$1,000,000	$1	....	.....	16	9¼	11⅞	7⅛	9⅜	2¼
11¼	6	200	7	6½	6½	North Central Texas	(sh)	400,000	N.P.	15cQ	9- 2-30	12⅜	9½	14¼	8½	18½	6¼
2½	⅜	1,000	⅞	⅝	⅞	Pandem	(sh)	489,875	N.P.	....	.....	9⅜	3¼	6	2⅛	3½	½
4⅜	1⅝	500	2⅝	2½	2½	Pantapec Oil	(sh)	1,506,000	N.P.	....	.....	12⅛	7	15⅝	8½	10½	1⅞
..	..	No sales.				Pennok Oil		150.000	N.P.	....	.....	12½	5⅛	7¾	4⅞	7¾	4⅜
10½	8	400	8	8	8	Red Bank Oil	(sh)	250,000	N.P.	....	.....	24⅜	7	18	4⅞	16	9⅝
5⅜	2⅛	100	2⅝	2⅝	2⅝	Reiter-Foster	(sh)	388,584	N.P.	10cQ	12- 2-29	15½	3½	12⅞	4⅛	8½	1¼
8⅝	2½	100	2¾	2¾	2¾	Ryan Consolidated	(sh)	500.000	N.P.	....	.....	7	4½	12	4⅜	11	3
2½	1⅜	200	2	2	2	Salt Creek Consolidated	(sh)	1,286.300	$10	10cQ	7- 1-30	8	5¼	7⅛	5½	5⅞	1¾
15¼	8¼	800	10	10	10	Salt Creek Producers	(sh)	1,496.859	$10	50cQ	8- 1-30	35½	27¼	35	23⅛	25⅞	9
1	½	100	½	½	½	Savoy Oil		$750.000	$5	....	.....	7	1¾	3½	1	2½	⅜
4½	2	200	2⅛	2⅛	2⅛	Venezuelan Petroleum	(sh)	755,090	$5	5cQ	2-15-30	7⅜	4¼	9⅛	4⅜	6½	1⅜
5	2	300	4	4	4	Woodley Petroleum		$500.000	$1	15cQ	3-31-29	7	4⅜	8¼	4⅞	9½	2
2½	½	100	¾	¾	¾	Y Oil & Gas		100,000	N.P.	....	.....	6	1¾	8⅜	2⅛	2⅞	¼

*Including one-half per cent monthly in stock. †Payable monthly and a monthly stock dividend of one-half per cent. x Ex-dividend.

STANDARD OIL STOCKS ON NEW YORK CURB

Quotations Compiled by Francis, Bro. & Co., Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

1930 High	1930 Low	Week ended September 24 Sales	Week ended September 24 High	Week ended September 24 Low	Week ended September 24 Close	Stocks—		Outstanding capital	Par value	Div. rate	Last paid	1927 High	1927 Low	1928 High	1928 Low	1929 High	1929 Low
18½	12¼	400	18½	18⅜	18½	Anglo-American Oil (vot. C.O.D.)		£4,192,635	£1	.36⅔	.....	21⅝	17⅜	22⅜	14⅜	17	11
1	⅜	100	⅜	⅜	⅜	Atlantic Lobos		.....	...	....	.....	..	..	..	..	..	..
25	14	50	16	16	16	Borne Scrymser		$1,000,000	$25	$18A	10-15-29	59	50	56½	44½	46½	25
69	54	200	55	54	55	Buckeye Pipe Line		$10,000,000	$50	$1Q	12-14-29	60	45	76	53	74½	55
184⅞	140⅛	100	147	147	147	Chesebrough Mfg.		$3,000,000	$25	$1Q*	7-30-30	126	76½	161	117	210	130
65¾	30½	100	32	32	32	Continental Oil (V.T.C.)		$36,057,840	$10	....	12-15-27	22⅝	16¼	23	16	29	10
54¾	39	100	39	39	39	Cumberland Pipe Line		$1,500,000	$50	$1Q	9-15-30	137	89	114	67	75¾	40
..	..	No sales.				Eureka Pipe Line		$5,000,000	$100	$1Q	8- 1-30	68½	47	88	64½	70½	42
7	2½	100	5	5	5	Galena Signal Oil		$16,000,000	$100	....	.....	13½	3½	13	4¼	6½	3
119	78	1,900	85¾	83½	84	Humble Oil & Refining		$74,103,300	$25	50cQ	7- 1-30	68½	54	114¾	59¼	128	74⅛
320	303	100	320	315	315	Illinois Pipe Line		$20,000,000	$100	$10SA	9-15-30	182	123¾	290½	176½	340½	260
30	18⅛	4,300	21¼	20¼	20½	Imperial Oil of Canada (new)	(sh)	26,421,768	N.P.	12½cQ	9- 2-30	64¾	37¾	104	56⅜	41	22
41	31¼	400	31¾	31¼	31¼	Indiana Pipe Line		$3,000,000	$10	50cQ‡	8-15-30	94½	61	91⅞	74⅜	41⅞	26
24	17½	3,400	18⅜	17⅝	17¾	International Petroleum	(sh)	14,247,088	N.P.	12½cQ	6-16-30	29	28¼	55	35	30⅜	15
22⅜	15⅛	100	16½	16½	16½	National Transit		$6,362,500	$12.50	25cQ‡	9-15-30	24	13½	32⅜	19⅜	25⅛	10⅛
21⅜	10⅛	x 100	14	14	14	New York Transit		$1,000,000	$10	40cQ†	4-15-30	44½	31¼	75	38½	17½	10
54	35	100	35	35	35	Northern Pipe Line		$2,000,000	$50	....	7- 1-30	100	70	69	56½	63	41
..	..	No sales.				Ohio Oil (new W.I.)		$60,000,000	$25	5cQ‡	12-14-29	67⅞	52	84	58½	79⅞	64⅛
32	17	200	22⅛	22	22	Penn Mex Fuel		$10,000,000	$25	50cQ	8-22-30	39	12	84	28	44½	20
33	10⅜	100	11	11	11	Solar Refining		$4,000,000	$25	$1.25SA	6-30-30	..	..	..	..	50	29
20⅞	10⅛	100	10⅛	10⅛	10⅛	Southern Pipe Line		$1,000,000	$10	5cQ	6- 2-30	27¼	15½	19	15	22½	13
45⅞	35	400	36	35½	35½	South Penn Oil (new)		$30,000,000	$25	50cQ	6-30-30	41½	35	71⅞	36¾	60¼	35⅛
65	35	100	45¼	45¼	45¼	Southwest Pennsylvania Pipe Lines		$1,750,000	$50	$1Q	1-10-29	83	55½	102	70	70	60
50¾	47⅝	9,600	48½	48⅛	48¼	Standard Oil of Indiana		$348,175,069	$25	62½cQ‡	9-15-30	81½	64⅜	95⅞	70⅞	63	45
40½	29	1,100	29¼	29	29	Standard Oil of Kentucky		$25,654,516	$10	40cQ	6-30-30	130	111½	179¾	122¼	46⅞	29
48⅞	44⅛	100	47½	47½	47½	Standard Oil of Nebraska		$4,649,225	$25	62½cQ‡	9-20-30	49½	40	54⅞	39⅞	50¼	40
108½	70	200	72½	70	70	Standard Oil of Ohio		$14,000,000	$25	62½cQ	7- 1-30	87½	72	134	71	129	60
10	7	100	7	7	7	Swan-Finch Co.		$861,466	$25	.43¾cQ	9- 3-30	21	14½	23½	16	18	10
97⅞	76⅛	2,700	76⅛	75	75	Vacuum Oil Co.		$126,180,350	$25	$1Q	9-20-30	..	..	111	72	133¾	75

*Plus 50 cents extra. †Plus 10 cents extra. ‡Plus 25 cents extra. x Ex-dividend.

TRANSACTIONS IN OIL SHARES ON NEW YORK STOCK EXCHANGE

Quotations Compiled by Francis, Bro. & Co., Members of the New York Stock Exchange and Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

1930 High	1930 Low	Week ended September 24 Sales	Week ended September 24 High	Week ended September 24 Low	Week ended September 24 Close	Stocks—		Outstanding capital	Par value	Div. rate	Last paid	1927 High	1927 Low	1928 High	1928 Low	1929 High	1929 Low
31½	18	1,800	22⅛	21½	21½	Amerada Corp.	(sh)	922,075	N.P.	50cQ	7-31-30	37⅝	27⅝	43⅞	27⅛	42⅝	17⅓
37	14⅜	400	16½	13¼	13¼	American Republics Corp.	(sh)	209,180	N.P.	$3.50S	12-31-29	82½	35⅛	85	51¾	64¾	12½
51	31½	30	41	40	40	Associated Oil		$57,260,300	$25	50cQ	6-30-30	50¼	35	53⅜	37½	47¼	34⅓
51¾	30⅛	8,600	32⅛	30¾	30¾	Atlantic Refining		$66,763,775	$25	25cQ	9-15-30	131⅜	104	66⅝	50	77⅜	30
34	20½	5,200	22⅛	20½	20¾	Barnsdall Corp. A		$56,546,600	$25	50cQ	8- 6-30	35½	20¾	54	20	49⅛	20
30½	17¾	6,400	18	17⅛	18½	Continental Oil of Delaware		4,741,554	N.P.	....	12-15-27	..	..	..	..	47¼	18
71⅛	38⅝	400	39½	39	39	General Asphalt	(sh)	413,333	N.P.	$1Q	9-15-12	96¾	65	94⅞	68	94⅝	42¾
116⅞	52¼	12,400	68¾	61⅛	63	Houston Oil		$24,968,600	$100	....	.....	175⅝	60⅛	167	79	109	26
32	19⅝	2,000	22⅞	22¼	22¼	Independent Oil & Gas	(sh)	1,362,295	N.P.	50cQ	7-31-30	32¾	17⅝	38⅜	21¾	39⅜	17⅜
28⅜	8¾	8,300	11½	10½	10⅝	Indian Refining		$12,565,070	$10	....	.....	12⅛	7⅝	39⅝	9	53	13¼
29½	21¼	1,900	27⅛	27⅛	27⅛	Lago Oil & Transport	(sh)	3,992,122	N.P.	....	5- 2-27	37¾	20½	39⅛	27⅜	38⅝	16⅛
12	8	1,600	8⅞	8⅜	8½	Louisiana Oil Refining	(sh)	1,190,063	N.P.	....	.....	18⅛	10	19¾	9⅜	18	7
10⅜	4⅛	900	4⅛	4⅛	4⅛	Maracaibo Oil	(sh)	330,000	N.P.	....	.....	22⅜	12	25½	12½	18½	5⅛
37	16⅛	18,400	22¼	20	20¾	Mexican Seaboard	(sh)	1,244,383	N.P.	....	10- 1-24	9¼	3	72	4⅝	59⅜	8¼
33	22⅛	1,000	22⅜	22⅛	22¼	Mid-Continent Petroleum	(sh)	1,857,912	N.P.	50cQ	7-15-30	39⅜	25½	44½	25⅛	39⅞	22¼
2½	⅝	200	⅝	⅝	⅝	Middle States ctfs.		$23,736,130	$10	....	7- 1-23	3¾	1⅝	7⅜	2⅜	5⅛	⅝
64¼	51⅝	200	56⅛	56⅛	56⅛	Pan American P. & T.		$50,084,700	$50	....	12-20-27	65⅞	40¼	50⅞	38¼	69	40½
67½	50½	5,000	56⅞	56	56	Pan American P. & T. "B"		$121,110,650	$50	....	12-20-27	66⅜	40¼	58⅞	37⅜	69¼	40½
..	..	No sales.				Pan American Western "B"		400,000	N.P.	....	1-30-27	37⅞	16¾	28⅝	15½	18½	13⅝
12¾	4⅛	200	4¾	4½	4½	Panhandle P. & R.	(sh)	199,370	N.P.	....	.....	18⅞	8	21⅜	11½	15¼	3
80	47½	100	70	70	70	Panhandle P. & R. pfd.		$2,564,400	$100	....	7- 2-23	83	54	108	70	76	47½
44¾	29⅛	8,600	30⅜	29½	29⅝	Phillips Petroluem	(sh)	2,593,075	N.P.	50cQ	6-30-30	60¼	36¼	53⅞	35¼	47	24¼
2½	1	900	1	1	1	Pierce Oil Corp.		$29,622,831	$25	....	.....	1⅛	½	5¼	½	3⅜	1
7⅛	2¼	600	4⅜	4¼	4¼	Pierce Petroleum	(sh)	2,500,000	N.P.	....	.....	5½	2½	7	3½	5⅞	⅛
54	32½	400	33	32⅝	32⅝	Prairie Oil & Gas		$60,848,000	$25	50cQ*	6-30-30	55½	45⅝	68	46	65⅝	40½
60	41⅜	2,400	42½	40¾	40¾	Prairie Pipe Line		$101,250,000	$25	75cQ†	6-30-30	190	130⅜	280	172	65	45
11⅞	6	200	6	6	6	Producers & Refiners		$37,438,950	$50	....	9-15-23	33⅞	16⅜	29⅞	16	25⅞	4
40	29	10	29	29	29	Producers & Refiners pfd.		$2,845,350	$50	....	5- 4-25	50	36⅞	49⅝	41	46¾	25½
27¼	18⅝	3,200	18⅞	18¼	18½	Pure Oil		$75,959,250	$25	37½cQ	9- 1-30	33½	25	31⅝	19	30⅜	20
28¼	14	10,900	15	14	14¼	Richfield Oil		$52,410,875	$25	50cQ	9- 1-30	28⅝	25⅜	56	23	49⅝	20
25⅜	12	4,900	13	12	12	Rio Grande Oil	(sh)	1,236,270	N.P.	$2A	7-25-30	..	..	37½	32	42½	15
56½	45¾	2,500	47½	46⅝	47	Royal Dutch, N. Y.	(sh)	611,303	...	$1.875	8-13-30	54½	44¼	64	44⅝	64	43¼
48⅜	40	50	41⅜	40¼	40¼	Shell Transport & Trading Co.		£23,985,000	£1	$1.45	7- 8-30	48⅝	40½	47⅞	41⅜	51½	40⅝
25½	13½	5,800	13¾	12⅞	13	Shell Union Oil	(sh)	13,066,497	N.P.	35cQ	6-30-30	31¾	23⅝	39¼	23¼	31⅜	19
37	18	2,100	19	17⅞	17⅞	Simms Petroleum		$8,353,620	$10	40cQ	9-15-30	25⅜	14¼	27¼	18⅛	40⅛	15
32	19⅝	17,400	19⅞	19¼	19⅜	Sinclair Consolidated	(sh)	5,500,000	N.P.	50cQ	7-15-30	22⅜	15	46¾	17⅜	45	21
112¼	108	100	110⅜	110⅜	110⅜	Sinclair Consolidated pfd.		$16,025,250	$100	$2Q	7-15-30	104½	97	110	102½	111	103
42	26½	1,400	26½	26¼	26¼	Skelly Oil		$27,441,250	$25	50cQ	9-15-30	37⅜	24⅛	42⅝	25	40½	28
75	55½	4,200	58⅜	57⅛	57⅞	Standard of California	(sh)	12,594,098	N.P.	62½cQ	9-15-30	60¾	50⅜	80	63	81⅞	51⅛
49	25	3,100	26½	25	25	Standard of Kansas		$8,000,000	$25	50cQ	9-15-30	20⅞	14⅝	37⅜	15	33⅜	18
84⅞	58	46,100	66⅝	64⅝	65¾	Standard Oil of New Jersey		$634,999,200	$25	25cQ*	9-15-30	41⅜	35⅛	59⅜	37⅜	83	49
40⅜	29⅝	9,300	30	29⅝	30	Standard Oil of New York		$445,223,675	$25	40cQ	9-15-30	34⅛	29⅜	33¼	28⅜	48⅛	31⅜
70	50	200	57⅛	57	57	Sun Oil	(sh)	1,416,869	N.P.	25cQ	9-15-30	34⅞	30	77	31½	68⅝	55
9⅜	2	1,600	2⅜	2¼	2¼	Superior Oil Corp.	(sh)	776,979	N.P.	....	12-20-20	..	..	..	..	24	8¼
60½	50	6,200	50½	50	50	The Texas Corp.		$246,204,900	$25	75cQ	7- 1-30	58	45	74¾	50	71⅞	50
14½	8¼	300	8⅜	8¼	8¼	Texas Pacific Coal & Oil Co.		$9,304,890	$10	2½%A‡	12-31-29	18⅞	12	26⅝	12⅛	23⅞	9⅓
31	19½	100	21¼	21¼	21¼	Tide Water Oil	(sh)	2,191,759	N.P.	20cQ	6-30-30	29⅛	19	41½	19⅝	40	14
94⅞	83	100	90	90	90	Tide Water 5% pfd.		$19,947,000	$100	$1.25Q	9-15-30	90⅛	85	100⅛	86	97½	85¼
17⅜	10¾	3,600	12¼	12	12	Tide Water Associated	(sh)	5,560,424	N.P.	30cS	8-15-30	19⅛	15¾	25	14¾	23½	10
89¾	78	100	81½	81½	81½	Tide Water Associated pfd.		$73,284,500	...	$1.50Q	7- 1-30	..	..	..	..	90⅞	74½
..	..	No sales.				Transcontinental Oil	(sh)	3,742,029	N.P.	....	5- 1-30	10⅜	3¾	14¾	7¼	15¼	5¼
50	37	1,000	37¾	37⅛	37⅛	Union Oil of California		$104,342,375	$25	50cQ	8- 9-30	56½	39⅝	58	42⅜	57	42¼
38½	25⅛	300	26¾	25¾	26¾	Union Tank Car (new)	(sh)	1,254,048	$100	$1.25Q	1- 2-30	127½	94	128⅛	110	163¾	121¼
27	10	11,600	10¾	10	10¾	Warner-Quinlan	(sh)	632,948	N.P.	50cQ	7- 1-30	34½	24½	44⅞	26	42⅞	15
..	..	No sales.				White Eagle Oil & Refining	(sh)	505,100	N.P.	50cQ	1-20-30	27½	20	38	20⅛	38	25
21	11½	300	12	12	12	Wilcox Oil & Gas	(sh)	428,907	N.P.	....	5-10-28	..	..	..	..	29¾	12¼

*Plus extra dividend of 25 cents. †Plus extra dividend of 50 cents. ‡Payable in stock. x Ex-dividend.

In comparing highs and lows for the several years in the three tables, it will be necessary to take into consideration cases where there have been splits in the stock.

GASOLINE AND KEROSENE PRICES ARE REDUCED

(Continued from Page 348)

put the oil if they send their cars for it. For months they have been taking only the minimum amount under their contracts.

In lubricating oils there is a light movement as the jobbers replace their supplies with winter oils, but beyond that there is little doing. Refiners are visiting the wholesale buyers, such as the compounders, and making their contracts for next year. The prices offered are attractive as compared with a year ago, but the industrial demand is still light.

So Many Gallons for a Dollar

Among the distributors there is now a regular epidemic of quoting prices on gasoline at so many gallons for the dollar. As the local state price is 19 cents regularly, the most that a jobber could offer would be five and a fraction gallons for that amount, but as a matter of fact they are offering seven gallons at some stations. This is believed to be the limit. Over in a Michigan city the cut-price stations have been running each other and a traveler stated that as many as 14 gallons for the dollar was offered by one dealer, the buyer paying the tax. From all parts of the territory come stories of the cutting of prices or the giving of some special inducement to get business. The custom of giving presents at the opening of a new station has taken a more practical form of late. Instead of giving the women a rose and the men a cigar, it has come to the giving of gasoline with each purchase of motor oils or vice versa. The Phillips Petroleum Co. blocked traffic in St. Louis by the gift of five gallons of gasoline with each order for five gallons of motor oil. In Indianapolis, the Mid-Continent Petroleum Corp. did the same thing with a similar offer.

Further reductions by eastern companies has convinced the jobbers that in a brief time there will be a general reduction in this territory. Last week the prediction was current that the reduction would be made on Tuesday or Friday. Those who might have some advance knowledge of the intentions of the major distributors profess that the matter of a reduction has not been considered. In the meantime, Chicago and St. Louis retain the distinction of being the only prominent cities in the territory which have a normal rate, although badly cut by the trackage companies and others of their ilk.

PRICES ARE UNDERGOING ADJUSTMENT IN THE EAST

(Continued from Page 349)

an owner of record is an oil company) were as follows:

For New York—52,000 bbls. of gas oil on the Chiloil; 97,000 bbls. of gasoline on the China Arrow (Standard Oil Co. of New York); 82,000 bbls. of gasoline on the Cities Service Oklahoma (Cities Service Co.); 129,000 bbls. of gasoline on the Tamiahua (Richfield); 65,000 bbls. of gas oil on the Tiger; 76,500 bbls. of gas oil on the Ario (Standard Oil Co. of New York).

For Philadelphia—110,000 bbls. of gasoline on the Western Sun (Sun Oil Co.).

For Norfolk—45,000 bbls. of gasoline on the Pueblo.

For Baltimore—48,500 bbls. of gasoline on the Agwiworld.

For Houston—71,500 bbls. of gasoline on the New Jersey (The Texas Company).

For Everett, Mass.—78,200 bbls. of fuel oil on the Oregon.

Petroleum Exports

There was a mixed trend in the refined products export market locally during the week ended September 20, with aggregate exports showing a little gain in volume over those for the previous week. New business was hesitant, reflecting the lack of confidence in the price structure, and declines during the week just ended tended to bear out the fears of export operators who have limited purchases to routine quantities for the past few months.

Operators believe that the lower price ranges now in effect will stimulate foreign buying to some extent, although it is expected that the real volume business on both gasoline and kerosene will go to the Gulf markets and to California.

The following table shows principal exports of refined petroleum products from New York for the past three weeks (all figures in gallons unless otherwise noted):

	Week ended—		
	Sept. 20	Sept. 13	Sept. 6
Gasoline	285,000	80,000	125,000
Naphtha	475,000	345,000	470,000
Kerosene	250,000	150,000	44,000
Fuel oil	175,000	28,000	.....
Lubricating oil	1,860,000	2,150,000	1,050,000
Petroleum, refined	1,325,000	1,195,000	848,000
	Pounds		
Petrolatum	.....	27,000	22,000
Paraffin wax	3,025,000	1,096,000	561,000
Refined	.....	75,000	36,000
Scale	1,248,000	75,000	260,000
Lubricating grease	900,000	930,000	1,117,000

The largest single shipment from New York for the week consisted of 1,200,000 gallons of refined products on the Anglia, of which 200,000 gallons were consigned to Bahia Blanca and 1,000,000 gallons to Santos.

Imports

Imports of crude and refined petroleum at the principal United States ports for the week ended September 20 totaled 1,861,000 bbls., an average of 265,857 bbls. daily, compared with 1,759,000 bbls., or 251,286 bbls. per day, for the preceding week and a daily average of 271,000 bbls. for the four weeks ended September 20. Details follow:

(Barrels of 42 Gallons)

At Atlantic Coast Ports—	
Baltimore	209,000
Boston	133,000
New York	1,008,000
Philadelphia	220,000
Others	144,000
Total	1,714,000
Daily average	244,857
At Gulf Coast Ports—	
Galveston district	63,000
New Orleans & Baton Rouge	84,000
Total	147,000
Daily average	21,000
At all United States Ports—	
Total	1,861,000
Daily average	265,857
Daily average four weeks	271,000

Distribution of total imports was as follows:

Crude oil	1,306,000
Fuel oil	555,000

USE PETROLEUM COKE AS REFINERY FUEL

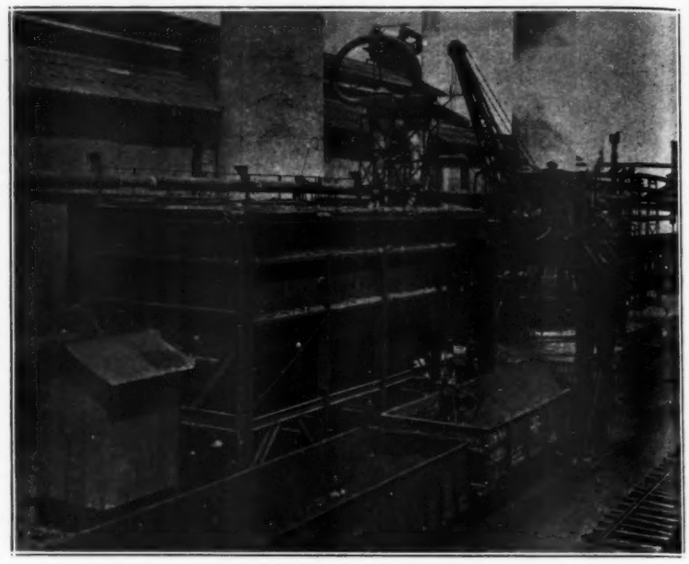
(Continued from Page 92)

ash from the last pass of the boiler and breeching with a fan.

The dust collected in this way is returned to the main storage bin and mixed with the raw coke for refiring. Thus whatever combustible material was carried over in the fly ash is to a large extent recovered.

High Efficiency

Recent tests on burning pulverized coke under a battery of four boilers have shown conclusively that the same relative heat extraction can be obtained from petroleum coke as when burning coal, oil or gas. Average boiler and furnace efficiencies of from 77 to 80 per cent were obtained at various ratings. The power input required to grind the coke varied from 15 kilowatt hours to 25 kilowatt hours to the ton, depending on the quality of coke handled. The best results were obtained by carrying the carbon dioxide of the flue gases between 14 and 15 per cent.



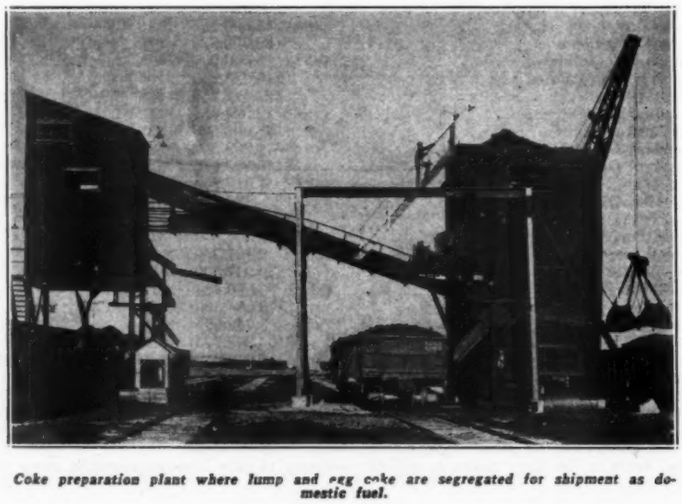
View showing main storage bin at rear of boiler house and Gantry crane for unloading cars. Cyclone separators for returning unburned fly ash to main storage bin can be seen above bin.

The coke as fed to the grinding mills averaged 10 per cent moisture but after grinding and drying with the preheated air this moisture content was reduced to .4 per cent.

Proximate analysis of the petroleum coke used in these tests on a dry basis was as follows, volatile combustible matter, 9.6 per cent; fixed carbon, 89.80 per cent; ash, .6 per cent; B.t.u. per pound, 15,000.

It will be noted that the percentage of volatile matter is between that of anthracite and bituminous coals. Any difficulty due to low volatility may be met either by grinding the coke finer or by using high temperature ignition arches in the furnace. The furnace design, size and type of pulverizing and the arrangement of the burners bear the same relation to the overall efficiency as is experienced with coal or other solid fuel.

In as much as 75 tons of petroleum coke are equivalent in heating value to 100 tons of average run of mine coal, marked savings may be realized in transportation, storage and handling. More-over, due to its low ash content, slagging difficulties and the expense of handling and disposal of ash are practically eliminated. Lastly, the fact that pulverized coal burning equipment handles petroleum coke with equal efficiency and makes it possible to interchange the fuels with no additional expense.



Coke preparation plant where lump and egg coke are segregated for shipment as domestic fuel.

REPORT OF THE BUREAU OF MINES FOR YEAR 1929

(Continued from Page 88)

close to 328,200 producing oil wells in the United States. This compares with 327,800 wells producing at the beginning of the year. As given above, there were over 15,000 oil wells completed during the year 1929, and the increase in total wells of only 400 indicates that there was almost a balance between new wells brought in and abandonments. The states which had nearly all the flush production in 1929, Texas, California and Oklahoma, had a net loss in number of wells in 1929, whereas the states of New York, Pennsylvania and West Virginia, with average yields per well per day of less than a barrel, all made a gain in number of wells during the same period.

The average yield per well per day in 1928 was 7.6 bbls.; the increase in 1929 to 8.4 bbls. was due primarily to the striking of gushers in the two leading states, Texas and California. The lowest average yields reported were in the Lima district of northwestern Ohio and northeastern Indiana, where an average of only .2 bbl. per well per day was produced. The highest average daily yield, 161.3 bbls., was credited to the West Texas fields, but this was considerably below the average of 208.9 bbls. achieved there in 1928.

Refined Products

Runs to stills of crude petroleum in 1929 totaled 987,708,000 bbls., an increase over 1928 of 8 per cent. Of this total, 912,191,000 bbls., or 92 per cent, was domestic crude and 75,517,000 bbls., or 7 per cent, was foreign crude oil. Compared with 1928, these data represent a gain in the use of domestic crude of 76,480,000 bbls. but a decline in the foreign crude of slightly over 2,000,000 bbls.

The production of motor fuel in the United States during 1929 amounted to 18,454,506,000 gallons, or 439,393,000 bbls., of which 435,078,000 bbls. was produced as "gasoline" at refineries. This represents an increase in motor fuel production over 1928 of 15 per cent. As noted above, the increase in crude runs to stills was 8 per cent, hence the additional 7 per cent gain resulted from a further gain in percentage recovery

which, in 1929, was 44.0 per cent as compared with 41.3 per cent in 1928. A portion of this gain in percentage yield resulted from a material increase in the quantity of natural gasoline blended. With the natural gasoline factor eliminated, the gain in recovery was close to 2 per cent, or the equivalent of from 37.4 to 39.3 per cent of the crude oil run. California reported the largest increase in gasoline recovery in 1929; the percentage in that State rose to 38 per cent from 32 per cent in 1928. A portion of the increased yield of gasoline in 1929 was due to a gain in cracking activity. The total production of cracked gasoline in 1929 amounted to 143,727,000 bbls., a gain of 17 per cent over 1928.

Increase in Imports

A material factor in the 1929 gasoline supply was an increase in imports of from 4,198,000 bbls. in 1928 to 8,834,000 bbls. in 1929. From a purely domestic standpoint the rapid growth in shipments of California gasoline through the Panama Canal to the Atlantic Seaboard was also very important.

The indicated domestic demand for motor fuel in 1929 amounted to 375,999,000 bbls., an increase of 43,966,000 bbls., or 13 per cent, over 1928. Exports increased from 53,412,000 bbls. in 1928 to 62,059,000 bbls. in 1929, a gain of 16 per cent. The trend of motor fuel stocks in 1929 was somewhat different from 1928. The peak stocks of March 31, 1929, were considerably higher than those of the corresponding period in 1928 and, though the heavy summer demand reduced these stocks to as low as 24 days' supply on August 21, the continued record breaking output carried over into the fall months caused a rapid accumulation of stocks during the last quarter of the year. Thus, the total on hand on December 31, 1929, 43,261,000 bbls., was over 10,000,000 bbls. above the quantity held on the first day of the year.

Natural Gasoline

According to monthly reports, the production of natural gasoline in 1929 amounted to 2,195,400,000 gallons, or 52,271,000 bbls., a gain over the preliminary total for 1928 of 24 per cent. The final 1929 figure, obtained through an annual canvass, amounted to 2,233,688,000 gallons. Production increased steadily in the spring of the year, showed little change during the summer months, rose rapidly in September and October but fell back in November and December. The production of October, 206,300,000 gallons, established a record, which up to August, 1930, had not been approached. The increased output of September and October resulted primarily from increased activity in the Panhandle and in the Santa Fe Springs Field.

During the first five months of the year, stocks of natural gasoline held by natural gasoline plant operators increased steadily and by May 31, had reached a new high level of 58,400,000 gallons. However, the increased demand for motor fuel in the summer months resulted in material drafts on stocks so that, despite additions to storage in November and December, the total at the end of the year, 25,400,000 gallons, was slightly under the amount on hand January 1.

The use of natural gasoline in blends at the plants showed a slight gain over 1928. A total of 27,700,000 gallons of natural gasoline and 32,300,000 gallons of naphtha were utilized in blends in 1929.

The world's production of crude petroleum during 1929 reached a total of 1,484,451,000 bbls., an increase over 1928 of 159,718,000 bbls., or 12.1 per cent. Production outside of the United States reached a total of 477,128,000 bbls., or 54,869,000 bbls. more than in 1928. Domestic production increased 105,849,000 bbls. The rate of increase in domestic production did not quite equal that of the foreign oil producing countries, consequently, the ratio of the United States production to the world total dropped from 68 per cent in 1928 to 67.9 per cent in 1929. Venezuela and Russia maintained their respective positions as the second and third largest producing countries.

PUTTING THE FINISHING TOUCHES ON OIL SHOW

(Continued from Page 85)

veterans of the oil industry will gather at the replica of the Drake well on the grounds for the ceremony which includes the awarding of gold badges to all new members of the exposition's "Pioneers of the Oil Industry Association," and the presentation of gold medals to the two grand old men of the oil business, one the choice of Tulsa, to act as welcoming officer, and the other to be elected on a basis of age, length of service and interest in the plans of the pioneer group.

The most recent choices for the highest honors of the oil show are Martin Moran, president of the Texas Pipe Line Co. of Oklahoma, and John C. Looker, who entered the industry more than 55 years ago at Bradford, Pa.

While the exposition has spared no effort in promoting the interests of the oil and gas business and its relation to the public, it has never permitted itself to forget that human beings have made the trail of oil all over the world. All of the funds which may be used as a free surplus after each oil show go toward a program of making the last days of those grizzled veterans happier. The plans call for a home for these men, where they may spend the darkening hours together reliving the old times.

Replica of First Oil Refinery

An important addition has been made to the museum department of the exposition. This is an exact replica of the primitive refinery built by William Barnsdall at Titusville, Pa., in 1860. This sandstone, stove pipe and wood affair offers a striking contrast to the polished plants of today.

Arrangements have been completed for facilitating transportation from the downtown section of Tulsa to the exposition plant. The Tulsa Junior Chamber of Commerce will have 150 automobiles at the service of visitors on the opening day, and from 60 to 70 automobiles in operation on each of the succeeding days. Gathering points for this carrier system are located at each of the principal hotels and the cars will leave at intervals of 30 minutes. This service is without cost to the visitors.

The junior chamber also provides three tours over the city. One of these is a trip over the industrial section which includes refineries, with open house at the principal plants, and the other two are a short and a long route covering the residential districts.

The International Petroleum Exposition golf tournament opens Monday morning, October 6, at the Tulsa Country Club, with the qualifying rounds scheduled for 8 o'clock. Frank S. Gray is in charge of the tournament which is expected to draw at least 500 entrants. Several of the past champions are back to try to regain their laurels, and the "runners-up" have improved their game.

On October 4 and 5, a program of expert horsemanship and roping will be presented by the Mounted Boys Troop of America of Baxter Springs, Kans. The boys, 200 in number, perform nearly all of the known feats of the equestrian art and the hempen noose, and range in ages from 5 to 15 years. Another feature, which, however, is not expected to revolutionize the practices of workmen on the derrick floor, is the aerial acrobatics of "Dare Devil" Gates, who will engage in breath-taking antics on a rope stretched between two of the tallest rigs. Roxey La Rose, known professionally as an "aerialiste," will attempt to throw the technique of Gates into the shadows with her own spectacular act. A polished floor and a dance orchestra will provide other diversion for visitors.

Nursery for Children

The oil show's nursery, attended by a staff of trained nurses, provides opportunities for children left there to enjoy themselves in the play rooms indoors or on the spacious fenced-in lawn. This convenience permits parents to make their survey of the exposition unhampered. A large staff of police officers will assist the visitors and keep undesirable out of the grounds.

The busy man will have at his service 50 telephones for local and long distance calls. Branches have been installed of the Western Union and Postal Telegraph companies, the American Express Co. and the United States postal department.

Registration

It is expected that this year the registration of guests will be carried out with great precision and speed, so that lists of visitors will be presented to the exhibitors every morning.

The exhibitor must take special care of his list because only enough copies for a distribution of one to each exhibitor will be printed. There will be a force of 50 employes working on the registration of guests.

Another increased facility for the exhibitors is that of the enlarged parking spaces and increased illumination.

All of the chairmen of the committees which will have charge of the oil show activities have been selected because of their strong support in the past, and their continued high interest in the work entrusted to them.

R. C. Sharp is general chairman of the reception committee and his appointments reveal the judgment which made his group's work outstanding in the 1929 oil show. W. A. Schlueter, as general chairman of the scientific committee, heads six corps of specialists. Members of committees include:

Executive branch of the reception committee—J. M. Hayner, chairman; Walter Ferguson, Exchange National Bank; Fred S. Cook, Prairie Oil & Gas Co.; Alf G. Heggem, Oil Well Improvements Co.; J. P. Flanagan, oil operator; P. M. Miskell, Empire Companies; W. W. Fleming, Mid-Kansas Oil & Gas Co.; R. L. Langenheim, University of Tulsa; W. M. Bovaird, Bovaird Supply Co.; James H. Gardner, Gardner Petroleum Co.; Fred B. Koontz, Mid-Continent Petroleum Corp.; W. H. Horster, manager Exchange Building, and W. A. Leonard, Hinderliter Tool Co.

General committee—Wilbur L. Nelson, professor of petroleum refining, University of Tulsa; Edward Anderson, associate professor of petroleum, University of Tulsa; Dr. E. D. Bloesch, geologist, and John A. Silsbee, engineer.

Opening ceremonies committee—Ralph Talbot, chairman; J. Burr Gibbons, Oil Well Improvements Co.; Victor Barnett, Tulsa Tribune; W. A. Cease of W. A. Cease Co., and W. H. Baley, Oklahoma Natural Gas Corp.

Old Timers committee—B. E. Horrigan, chairman; Murray Doan; C. J. Wrightsman; J. J. Conry, Carter Oil Co.; W. G. Skelly; F. O. Larson, Tulsa World; Andrew M. Rowley, The Oil and Gas Journal; Waite Phillips; Victor Barnett, Tulsa Tribune; A. W. Leonard, Devonian Oil Co.; J. J. Larkin, Larkin Torpedo Co.; J. H. Markham; James A. Veasey, Carter Oil Co.; Joseph H. Evans, Devonian Oil Co.; Glenn Condon, Skelly Oil Co.; J. P. Flanagan; H. H. Rogers, president Exchange National Bank; Lawrence E. Smith, National Petroleum News; W. B. Way; J. L. Dwyer, Petroleum Engineer; Omer K. Benedict, and Dr. S. G. Kennedy.

Scientific and technical committee—W. A. Schlueter, general chairman; refining division, J. L. Wadsworth, chairman; F. R. Staley; M. P. Youker, Phillips Petroleum Co.; L. L. Davis, Continental Oil Co.

Natural gasoline division — Emby Kaye, chairman; T. E. Legatski, Phillips Petroleum Co.; J. W. Vaiden, Skelly Oil Co.; S. S. Smith, Shell Petroleum Corp.

Pipe line transportation division—W. G. Heltzel, Sinclair Pipe Line Co., chairman; T. D. Williamson, Petroleum Electric Co.; J. V. Hunter, Gulf Pipe Line Co. of Oklahoma; A. V. Horne, Empire Pipe Line Co.; W. H. Steuve; J. H. Tubbs, Deep Rock Oil Co.; C. F. Guinn, Tidal Oil Co.

Production division—C. F. Comstock, chairman; K. C. Sclater; J. R. McWilliams, Skelly Oil Co.; W. K. Whiteford, Barnsdall Oil Co.

Natural gas division — Frank Long, chairman; Reid S. McBeth, Oklahoma Natural Gas Corp.; R. W. Hendee, Oklahoma Natural Gas Corp.

Open forum division—George G. Oberfell in charge.

One of the busiest men around the Exposition offices is Victor Shenk, assistant general manager. He has been associated with the Exposition management for four years.

OSAGE LEASES AVERAGE $5.75 PER ACRE TO HEADRIGHT OWNERS

Owners of Osage Indian headrights, numbering 2,229, realized about $50 each from the public auction sale of oil leases held in Pawhuska on Monday, September 29. Altogether, 17,369 acres were disposed of at a total of $101,530, or an average of $5.75 per acre.

Not since the first sale on November 11, 1912, has less money been realized for Osage leases. At the first sale 24,541 acres were sold for $39,436, or an average of $1.69 per acre. On June 30, 1916, 2,482 acres were sold for $1,169,280.78, or an average of $471.10 per acre, which average has never since been equaled. On March 18-19, 1924, 59,982.24 acres were sold for $14,193,300, an average of $278.40 per acre. It was at this sale that one 160-acre tract brought $1,990,000.

The Government seemed willing to let leases go at any price on Monday. Many quarter sections were knocked down on the first bid of $100, and Colonel Walters, the veteran auctioneer, who has sold over $100,000,000 worth of leases for the Osages, and an additional $100,000,000 worth of public lands for the United States Government, got real enthusiastic over any little battle of bidders that sent the price up above $1,000, even though he used to spurn bids of less than $10,000 at a time in the old days when a million dollar bid was merely an incident to a sale.

A number of new bidders appeared at Monday's sale, which was slimly attended, and from which the buyers of all but two of the major oil companies were absent. The largest bid of the day was that of the Lewis Production Co. which paid $17,000 for the southwest quarter of Section 23-25-6, in the Burbank area. The Kewanee Oil & Gas Co. paid $14,500 for the southwest quarter of Section 27-26-6, also in the Burbank district. Charles B. Peters of Tulsa bid in a considerable number of tracts for the Peters Petroleum Corp. and the Norbla Oil Co. and the Indian Territory Illuminating Oil Co., represented by Hugh Mauldin, were successful bidders, picking up "bargains" on both the east and west side.

Following is the list of tracts, bonus price paid and the successful bidders:

EAST SIDE

Tract	Description	Acreage	Purchaser	Bonus
1	NW 2-20-12	160	R. E. Morgan, Tulsa	$100
2	SW 29-20-12	160	Lindy Oil Co., Tulsa	100
3	NE 26-20-11	160	Sand Springs Home	100
4	NE 30-20-11	160	Sand Springs Home	100
5	SE 33-21-11	160	Pioneer Pet. Co., Tulsa	100
6	SW 33-21-11	160	Pioneer Pet. Co., Tulsa	100
7	SE 8-26-11	160	Norbla Oil Co., Tulsa	100
8	SW 8-26-11	160	Phoenix Drilling Co., Tulsa	100
9	SE 27-27-11	160	Norbla Oil Co.	100
10	SW 27-27-11	160	Norbla Oil Co.	100
11	SW 27-28-11	160	C. E. Duffield	100
12	NW 2-20-10	160	Sand Springs Home	350
13	SE 27-20-10	160	Lewis Prod, C., et al	300
14	NE 33-20-10	160	Norbla Oil Co.	425
15	SW 13-21-10	160	A. G. Oliphant, Tulsa	325
16	NE 14-21-10	160	J. R. Higgins, Tulsa	600
17	SE 20-21-10	160	Samuel E. Wolff, Sand Springs	200
18	SW 21-21-10	160	Samuel E. Wolff, Sand Springs	225
19	SW 28-21-10	160	Samuel E. Wolff, Sand Springs	100
20	NE 35-21-10	160	J. E. Cooper, Tulsa	200
21	NW 35-21-10	160	J. E. Cooper, Tulsa	100
22	SW 8-22-10	160	Indian Ter. Illuminating Oil Co.	225
23	NE 8-22-10	160	Indian Ter. Illuminating Oil Co.	425
24	NW 8-22-10	160	Lewis Production Co.	950
25	SW 17-22-10	160	A. G. Oliphant	3,100
26	SW 15-22-10	160	Passed	...
27	NE 22-22-10	160	Passed	...
28	SE 31-22-10	160	Passed	...
29	NE 32-14-10	160	Passed	...
30	NW 32-24-10	160	Passed	...
31	SE 3-26-10	160	Indian Ter. Illuminating Oil Co.	400
32	SW 15-26-10	160	F. E. Madden, Tulsa	100
33	NE 22-26-10	160	Frank J. Carroll, Chicago	100
34	NW 22-26-10	160	Passed	...
35	SE 14-28-10	160	Winona Oil Co.	100
36	NE 15-28-10	160	Winona Oil Co.	100
37	SE 15-28-10	160	Winona Oil Co.	400
38	SW 1-20-9	160	J. L. Essley, Tulsa	225
39	Fr. NW 12-20-9	39	J. L. Essley, Tulsa	130
40	NE 18-21-9	160	V. C. Madden, Tulsa	200
41	NW 18-21-9	160	J. A. Davis, Cleveland, Okla.	325
42	SE 27-21-9	160	Ohio-Osage Oil Co.	500
43	SW 27-21-9	160	Charles R. Gray & R. S. Tolson	425
44	NE 34-21-9	160	Ohio-Osage Oil Co. et al	400
45	NW 34-21-9	160	Ohio-Osage Oil Co., et al	100
46	SE 9-22-9	160	R. J. Northern, Waynesboro, Pa.	100
47	SW 9-22-9	160	R. J. Northern, Waynesboro, Pa.	100
48	NE 19-22-9	160	Norbla Oil Co.	100
49	NW 19-22-9	160	Norbla Oil Co.	100
50	SE 19-22-9	160	Norbla Oil Co.	100
51	SW 19-22-9	160	Norbla Oil Co.	100
52	NE 15-23-9	160	Passed	...
53	SW 27-23-9	160	National Refining Co.	400
54	NE 33-23-9	160	Frank J. Carroll, Chicago	100
55	SW 8-24-9	160	Frank J. Carroll, Chicago	100
56	SW 14-24-9	160	Passed	...
57	NE 11-25-9	160	Peters Petroleum Corp.	1,050
58	SE 11-25-9	160	Peters Petroleum Corp.	900
59	SE 14-25-9	160	Passed	...
60	SW 28-25-9	160	Link Oil Co., Tulsa	100
61	NW 30-25-9	160	L. G. Stanley, Pawhuska	100
62	NW 8-26-9	160	National Refining Co.	1,650
63	SE 27-26-9	160	Passed	...
64	SW 27-26-9	160	Wallace Lee, Okmulgee, Okla.	100
65	NW 34-26-9	160	Wallace Lee, Okmulgee, Okla.	100
66	NE 12-28-9	160	Peters Petroleum Corp.	100
67	NW 12-28-9	160	Peters Petroleum Corp.	100
68	SE 12-28-9	160	Peters Petroleum Corp.	100
69	SW 12-28-9	160	Peters Petroleum Corp.	100
70	NE 3-21-8	160	Turman Oil Co., Tulsa	2,200
71	SE 3-21-8	160	H. H. Mundy et al, Pawhuska	2,800
72	SW 8-22-8	160	Ray Branstetter, Skiatook, Okla.	100
73	NW 25-22-8	160	Passed	...
74	SW 25-22-8	160	Passed	...
75	NE 26-22-8	160	Passed	...
76	SE 26-22-8	160	Passed	...
77	SE 11-23-8	160	Passed	...
78	SE 25-23-8	160	H. H. Markey, Tulsa	200
79	NE 30-23-8	160	Passed	...
80	SE 36-23-8	160	H. H. Markey, Tulsa	100
81	SW 36-23-8	160	H. H. Markey, Tulsa	100
82	SE 13-24-8	160	A. G. Oliphant, Tulsa	2,200
83	NE 24-24-8	160	Norbla Oil Co.	400
84	NW 27-24-8	160	Passed	...
85	SW 27-24-8	160	Passed	...
86	NW 32-24-8	160	Hill Drilling Co., Tulsa	500
87	NE 8-26-8	160	Passed	...
88	NW 8-26-8	160	Passed	...
89	SE 8-26-8	160	Passed	...
90	SW 8-26-8	160	Passed	...
	Total			$26,350

WEST SIDE

91	SW 2-23-7	160	Charles R. Gray, Pawhuska, Ok.	1,000
92	SE 3-23-7	160	Ray Branstetter, Skiatook, Okla.	100
93	NE 13-23-7	160	A. G. Oliphant, Tulsa	2,600
94	NW 15-23-7	160	Norbla Oil Co., Tulsa	100
95	SE 2-24-7	160	National Refining Co.	300
96	SE 6-24-7	160	Frank J. Carroll, Chicago, Ill.	100
97	NE 11-24-7	160	National Refining Co.	1,700
98	NE 15-24-7	160	Producers & Refiners Corp.	3,400
99	SE 15-24-7	160	Continental Oil Co.	6,700
100	SW 15-24-7	160	Producers & Refiners Corp.	9,000
101	SW 27-24-7	160	Peters Petroleum Corp.	3,500
102	SE 28-24-7	160	Lewis Production Co.	6,300
103	NE 32-24-7	160	Charles R. Gray & R. S. Tolson	1,000
104	NW 16-25-7	160	Passed	...
105	SW 16-25-7	160	Passed	...
106	NE 17-25-7	160	Passed	...
107	SE 17-25-7	160	Passed	...
108	SW 18-25-7	160	Peters Petroleum Corp.	100
109	SE 19-25-7	160	Peters Petroleum Corp.	100
110	SW 19-25-7	160	Peters Petroleum Corp.	100
111	NE 35-25-7	160	Peters Petroleum Corp.	100
112	NW 35-25-7	160	Peters Petroleum Corp.	100
113	NE 4-26-7	160	Peters Petroleum Corp.	100
114	NE 22-26-7	160	Passed	...
115	NW 23-26-7	160	Passed	...
116	SE 23-26-7	160	Passed	...
117	SW 23-26-7	160	Passed	...
118	SE 21-27-7	160	Passed	...
119	NW 25-27-7	160	Passed	...
120	NE 28-27-7	160	Passed	...
121	SE 5-28-7	160	Winona Oil Co.	150
122	NE 9-28-7	160	L. G. Stanley et al, Pawhuska	300
123	NE 17-28-7	160	Winona Oil Co.	100
124	NE 21-28-7	160	A. G. Oliphant, Tulsa	600
125	SW 22-28-7	160	Peters Petroleum Corp.	750
126	NE 35-28-7	160	National Refining Co.	100
127	NW 35-28-7	160	National Refining Co.	100
128	SE 35-28-7	160	National Refining Co.	100
129	SW 35-28-7	160	National Refining Co.	100
130	SW 6-23-6	160	Passed	...
131	SW 10-23-6	160	Frank J. Carroll, Chicago, Ill.	100
132	SE 13-23-6	160	Passed	...
133	NE 19-24-6	160	Passed	...
134	SE 19-24-6	160	Passed	...
135	SE 22-24-6	160	National Refining Co.	300
136	SE 34-24-6	160	Passed	...
137	NW 5-25-6	160	Devonian Oil Co.	1,300
138	SE 7-25-6	160	Peters Petroleum Corp.	100
139	NE 9-25-6	160	Peters Petroleum Corp. et al.	100
140	SE 9-25-6	160	Indian Ter. Illuminating Oil Co.	2,300
141	SW 23-26-6	160	Lewis Production Co.	17,000
142	SW 27-26-6	160	Kewanee Oil & Gas Co.	14,500
143	NW 13-27-6	160	Midco Oil Corp.	100
144	NE 22-27-6	160	Indian Ter. Illuminating Oil Co.	100
145	NW 23-27-6	160	Indian Ter. Illuminating Oil Co.	100
146	NE 21-25-5	160	Peters Petroleum Corp.	100
147	NW 22-25-5	160	Peters Petroleum Corp.	100
148	SW 22-25-5	160	Peters Petroleum Corp.	100
149	NE 31-25-5	160	Peters Petroleum Corp.	100
150	NE 11-26-5	160	Passed	...
151	SW 11-26-5	160	Passed	...
152	NE 19-26-5	160	Passed	...
153	NE 33-26-5	160	Passed	...
154	SW 33-26-5	160	Passed	...
155	SE 13-26-4	160	Passed	...
156	NE 24-26-4	160	Passed	...
157	NW 24-26-4	160	Passed	...

Total acreage	24,999	Total West Side	$75,250
West side	10,720	Grand total	$101,530
East side	14,279	Acres sold	17,639
		Average bonus price per acre	$5.75

PURE OIL COMPANY BUYS INTEREST IN AJAX LINE

NEW YORK, Sept. 27.—Pure Oil Co. has completed negotiations for a joint interest with Standard Oil Co. (New Jersey) in the new Ajax Pipe Line Co. The Pure Oil Co.'s interest is said to be a substantial one, but the extent of its holdings has not been divulged. The New Jersey company, however, retains a majority ownership.

Ajax Pipe Line Co. is constructing a 10-inch pipe line from the Glenn Pool in Oklahoma to Wood River, Ill., where it will link with several of the eastern lines to transport crude from Wood River to points in Ohio, West Virginia, Kentucky and Canada. Participation of Pure Oil in the Ajax company will result in the linking up of the Pure Oil refineries at Newark, Ohio, Toledo, Ohio and Charleston, W. Va., with the company's production in the Mid-Continent.

"As a part of the understanding between the two companies," says the Standard Oil Co. (New Jersey), in announcing the deal, "the Humble Pipe Line Co. will build a line from the Van Zandt Field in East Texas to Shreveport, La., where connections will be made with the Standard Pipe Line running to the Baton Rouge refinery of the Standard Oil Co. of Louisiana. The Pure Oil Co. is the largest operator in the Van Zandt area and under the agreement can trade Van Zandt oil for crude produced by the Carter Oil Co., a subsidiary of the Standard Oil Co. (New Jersey) in Oklahoma convenient to the new Ajax line.

"This arrangement permits not only a great degree of flexibility to both companies in handling and transporting their crude but will have the effect of permitting the transporting pipe lines to use their resources to the best advantage in meeting current emergency situations as they may develop without involving duplication of costly facilities."

PRICE CUTTING BRINGS STANDARD REDUCTIONS

(Continued from Page 352)

cording to Edward G. Seubert, president.

"For a long time a very serious condition of overproduction of crude oil and gasoline has existed in the oil industry," Mr. Seubert said. "This situation has forced some refiners to sell their products below cost. With 'distress' gasoline obtained under these conditions, various individuals and organizations have sought by 'cut prices' to seize a temporary advantage. Their profits have merely represented the losses of the distressed refiners.

"These opportunists have no considerable permanent investment. The oil industry, with its $12,000,000,000 investment, which has so long rendered an indispensable service to the public, means nothing to them compared with their temporary gain.

"Our prices have at all times been as low as cost and a reasonable return on invested money warranted.

"Recent prices were not too high by any standard of comparison with other commodity prices. Lower prices will not improve the situation in the oil industry as a whole. While consumers will profit for the time being, it is doubtful if the public can profit in the long run from any development depressing the earnings of the industry still further.

"We are acting under the necessity of protecting our interests at this time when distress selling in the industry, complicated and aggravated at many points by 'bootlegging' of inferior gasoline and evasion of state gasoline tax, has brought about a chaotic price condition."

FEW CHANGES MADE IN OKLAHOMA QUOTATIONS

(Continued from Page 82)

the minimum guarantee and for that reason will continue to purchase on a basis of the published quotations.

This is a general situation to which there are exceptions. A few refiners in their anxiety to secure contracts have given guarantees as much as 6 cents under the service station prices with a commission to brokers who made the contracts. In some cases the sellers have given the buyers local protection on tank wagon and service station reductions and in cases where price wars have developed the minimum contract prices are below the published quotations. Should the unsatisfactory condition which prevails in retail market spread and result in additional reductions, refiners with these wide margin contracts will find themselves in an unenviable position of "holding the sack" in price wars over which they have no control.

The price reductions as explained by President Seubert of the Standard Oil Co. of Indiana were brought about by price cutters who have taken advantage of the condition in the refinery market buying at distress prices and selling under the general tank wagon and service station levels. These jobbers have been able to secure a substantial part of the business throughout the Middle West finally forcing the larger distributors to recognize them. It is probable that these major distributors will make whatever price adjustments are necessary to meet this competitive situation through the fall and winter months.

Gasoline and Naphtha

Interest in the gasoline market on Monday and Tuesday centered in October business. As previously indicated most of the sellers were marking time to see what would happen next which would have some direct or indirect bearing on their market. The U. S. Motor grade has been sold for spot delivery and shipment over October at least as low as 5¾ cents. Sales ranged up to 6½ cents.

Some small export business was placed last week with Oklahoma refiners at prices in line with the domestic market. Domestic trading in the high gravities was dull and sales as in the case of the U. S. Motor grade were made over wide ranges. Naphtha prices are one-quarter cent lower.

Kerosene

Kerosene prices were holding the first of the week although the demand is slow. The 2-cent reduction in tank wagon prices was expected, due to the wide spreads which have prevailed for months between the tank wagon and delivered tank car prices.

There has been considerable price cutting in the kerosene tank wagon market as in the case of gasoline. Many jobbers had a margin as high as 9 cents a gallon between a delivered tank car price from Oklahoma and the posted tank wagon price at their bulk stations. This resulted in reductions being made to customers, particularly farmers who bought a barrel or more for tractor consumption.

The 41-43 water white grade was selling at Oklahoma refineries at a low of 3⅛ cents, with 3¼ to 3½ cents the usual price from the larger refiners.

Fuels

Little attention was given to any grade of fuel during the past week. Prices are steady and movement reported from "fair" to "good." Some of the buyers anticipating a break in the Oklahoma City and Panhandle crude oil prices are expecting some bargain quotations in October.

This material, whether it is a fuel oil residuum, gas oil or distillate, if it becomes available, will probably have a high cold test. The market for high cold test grades is limited and sellers will have difficulty in disposing of their output regardless of price. The demand for the better grades of furnace oil continues steady with firm prices.

Natural Gasoline

Natural gasolines closed the month on Tuesday with prices unchanged at 6 cents for all grades. An easier tone has developed in this market and it was expected that this would be reflected in October prices. The season when refiners buy large quantities of natural gasoline to "pep" up refinery gasoline in storage is nearing an end and this will result in some decline in the refinery demand. The manufacturers, however, expect to maintain a normal price relationship between their product and refinery gasoline.

Lubricants and Wax

Sellers of bright stock and steam refined stock still have plenty of competition. Most of the refiners in Oklahoma are trying to maintain a low of 8 cents on steam refined stock and 25 cents on a 150-160 grade of low cold test bright stock. But these prices are being shaded on material coming from Oklahoma and other Mid-Continent, Gulf Coast and middle western refiners. Neutral oil quotations are firmer than the cylinder stocks.

The wax demand is more active with no change in price ranges.

PRORATION COMMITTEE SEEKS TO RELIEVE OKLAHOMA CITY OPERATORS

Operators in the prorated fields in Oklahoma outside of the Oklahoma Field will meet Friday morning, October 3, at 10 o'clock in the meeting rooms of the Mid-Continent Oil and Gas Association in Tulsa to receive the report and recommendations of the proration committee headed by C. C. Herndon, applying to curtailment of production and proration of pipe line runs in Oklahoma in the last three months of the year. The committee's report was submitted to Oklahoma City operators on Wednesday.

In making up its schedule for the last three months of the year the proration committee estimated that approximately 500 Oklahoma City oil wells now have a potential production of 2,000,000 bbls. in one day and that the field before the end of the year may be able to produce 3,000,000 bbls. in a day. In the face of these facts the committee considered that to curtail the actual production of Oklahoma City to less than 100,000 bbls. a day would place a severe strain upon the ability of operators there to conform their operations to it. Therefore, the committee concluded, every barrel of potential market outlet for the Oklahoma City Field should be recognized and utilized for the relief of Oklahoma City operators.

The committee issues a warning that if proration breaks down, with the production of Oklahoma at approximately 3,000,000 bbls. or more per day, not only would the condition of waste and demoralization reach staggering proportions, but the correlative or coequal rights of producers in various pools would be seriously impaired, if not destroyed.

The committee calls attention to the enormous potential of Oklahoma City, estimated at 2,799,000 bbls. per day in October, 3,212,000 bbls. in a day in November and 3,446,000 bbls. a day in December, and adds that however much the figures are discounted, the production exceeds all transportation and marketing facities and if it is not curtailed every form of waste prohibited by the statutes of Oklahoma will be committed, including the flowing of oil into open storage, and the correlative and coequal rights of producers not owning pipe line outlets will be irreparably impaired.

In the matter of crude oil market outlet, the committee reports that a thorough canvass of the oil purchasers of Oklahoma crude oil, which included an inquiry among the highest officials of major companies in New York, had been made, and the demand was found not to exceed 550,000 bbls. a day in October, with the possibility of a reduction to 545,000 bbls. per day in November and 535,000 bbls. a day in December.

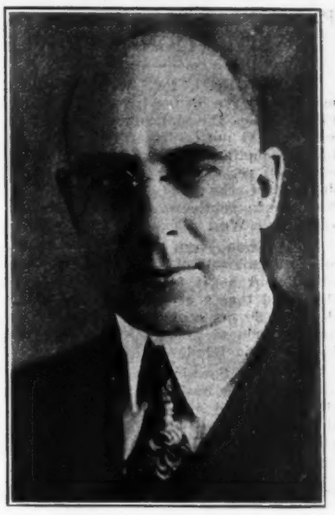
The following is a tabulation of the committee's various recommendations of potentials and allowable production from the prorated pools:

SCHEDULE OF SUGGESTED PRORATION FOR FOURTH QUARTER OF 1930

	October		November		December	
Field—	Estimated potential	Estimated prod.	Estimated potential	Estimated prod.	Estimated potential	Est. prod.
Production allowed—50%:						
Allen (Wilcox)	8,825	4,413	8,335	4,168	7,920	3,960
Allen (Cromwell)	17,389	8,695	16,867	8,433	16,361	8,180
Bowlegs	27,477	13,734	26,653	13,326	25,853	12,927
Earlsboro (proper)	27,805	13,903	26,971	13,485	26,162	13,081
Earlsboro Townsite	10,000	5,000	9,700	4,850	9,400	4,700
Little River	45,132	22,566	43,778	21,889	42,465	21,232
East Little River	23,482	11,741	22,700	11,350	22,000	11,000
Marshall-Lovell	5,000	2,500	5,000	2,500	4,500	2,500
Maud	5,541	2,771	5,375	2,688	5,214	2,607
Mission	14,233	7,117	13,806	6,903	13,392	6,696
Sasakwa	10,300	5,150	9,785	4,893	9,295	4,648
Searight	12,809	6,405	12,425	6,212	12,052	6,026
Seminole	27,616	13,808	26,788	13,394	25,984	12,992
East Seminole	4,021	2,011	3,900	1,950	3,783	1,892
St. Louis	37,803	18,902	36,669	18,334	35,569	17,784
Total	277,433	138,716	268,752	134,375	259,950	129,975
Production allowed—25% (graduated):						
Carr City (adjusted)	22,415	6,936	25,965	7,783	28,510	8,380
East Earlsboro (adjusted) (market outlet)	45,000	15,000	43,000	15,000	40,000	15,000
South Earlsboro (adjusted)	36,000	9,000	33,000	8,250	30,000	7,500
Total	103,415	30,936	101,965	31,033	98,510	30,880
Production allowed—18¾% maximum:						
West Asher-Wanette (market outlet)	50,000	7,200	45,000	7,200	41,000	7,200
Konawa (adjusted)	89,500	18,188	88,365	17,933	84,234	17,117
Oklahoma City (market outlet)	2,800,000	131,095	3,319,000	134,589	3,446,000	131,003
Total	2,939,500	156,483	3,352,365	159,722	3,571,234	155,320
Production allowed—adjusted maximum:						
Tatums (new area)	18,000	4,000	15,000	4,000	12,000	4,000
Chandler	25,000	2,500	25,000	2,500	25,000	2,500
West Perry	1,200	600	1,150	600	1,100	600
Orlando	850	400	825	400	800	400
Twp. 20n-Range 4w	800	400	775	400	750	400
Wildcat wells	3,000	3,000	10,000	200	10,000	200
Total	48,850	10,900	52,750	8,100	49,650	8,100
New wells (outside of Oklahoma City)—following 24-hour production for testing	5,000	5,000	5,000	5,000	5,000	5,000
Settled fields (leases producing over margin of 5 bbls. average per well)—50% curtailment above 5-bbl. margin	167,130	110,815	165,040	109,770	162,950	108,725
Wells in prorated areas, not prorated	5,000	5,000	5,000	5,000	5,000	5,000
Total prorated areas	3,546,328	457,850	4,050,872	453,000	4,152,294	443,000
Settled fields—production not prorated	92,150	92,150	92,000	92,000	92,000	92,000
Total all fields	3,638,478	550,000	4,142,872	545,000	4,244,294	535,000

R. S. ELLISON CHOSEN TO HEAD STANOLIND

CHICAGO, Sept. 30.—Appointment of R. S. Ellison of Casper, Wyo., as president of the proposed Stanolind Crude Oil Purchasing Co. and as a director of the Stanolind Pipe Line Co. to serve in an executive capacity to be announced later, was announced today by Edward G. Seubert, president of the parent Standard Oil Co. of Indiana. Mr. Ellison's offices will be in Tulsa. He has been associated with the Midwest Refining Co. since early in its history. Mr. Ellison has been an outstanding figure in the development of the Salt Creek oil field as vice president in charge of production at Casper in the past 11 years. The Stanolind companies which he will assist in reorganizing and operating for the Standard of Indiana were formerly known as the Sinclair Pipe Line Co. and Sinclair Crude Oil Purchasing Co.



R. S. Ellison

Henry Phillips, now president of the Sinclair Crude Oil Purchasing Co., has resigned, but will remain with the Sinclair companies. There will be no changes in the personnel, Mr. Phillips says.

OKLAHOMA NOT TO SINK DURING REMOVAL OF OIL

NORMAN, Okla., Sept. 29.—(Special) If all the oil and gas that has been taken from the ground in Oklahoma had left large vacant spaces beneath the surface, Oklahomans might have cause to worry, but fortunately, such is not the case, according to Dr. Charles N. Gould, director of the Oklahoma Geological Survey at Norman. In most cases the space occupied by the oil and gas has been replaced by salt water, and even if this were not the case, Doctor Gould does not believe there would be any danger of the surface sinking to fill the gaps left by the oil and gas.

Oil and gas does not ordinarily occur in pools beneath the ground, in the sense of a large cavity filled with the fluid, Doctor Gould explained. Instead, these materials are found in porous rock formations, usually sandstones, so that their removal would not greatly weaken the structure of the rocks. In fact, many oil sands do not differ materially from dry sands, except that the porous spaces are filled with oil. Usually at the edge of an oil field the sand containing the oil is found to contain salt water, and as the oil is taken out, the salt water crowds into the spaces vacated by the oil.

When one considers that a barrel of oil occupies a space of approximately 7 feet, and that over 2,000,000,000 bbls. of oil and vast amounts of gas have been produced from beneath the surface of Oklahoma, it can be seen that a considerable amount of space was required to furnish so much production. However, the space occupied by the oil before it was brought to the surface by means of

wells was found in the small spaces between sand grains or in some other porous formation.

In only a few rare instances, such as the recent surface slumping in a Texas field, have there been any surface disturbances noted after large amounts of oil had been removed from a field, Doctor Gould said. He believes it rather unlikely that any of the fields that have produced oil in Oklahoma will ever show slumping or other disturbances on the surface.

PENNSYLVANIA OIL SITUATION IMPROVES

PITTSBURGH, Pa., Sept. 27.—At a meeting of the Pennsylvania Grade Oil Conservation Board held in this city it was decided until further notice to curtail production of Pennsylvania Grade oil to 60 per cent of the potential production of the fields of southwestern New York, southeastern Ohio, Pennsylvania and West Virginia.

Notice was given that all producers must scrupulously observe the 40 per cent curtailment as it is the firm belief of the board that a greater quantity of oil than the 60 per cent now permitted cannot be produced without jeopardizing the Pennsylvania Grade oil industry.

The new allowable production, which is an increase over the previous allowable, was fixed after a careful canvass of the marketing situation and the requirements of refiners purchasing Pennsylvania Grade oil.

CALIFORNIA PETROLEUM ACCOUNTANTS' SOCIETY

LOS ANGELES, Calif., Sept. 27.—With its dinner meeting on Thursday evening, September 25, in the Commercial Club of Southern California, the Petroleum Accountants' Society of Los Angeles began its fall and winter activities.

Headed by A. J. Olmsted of Chanslor-Canfield Midway Oil Co., the society is sponsoring an ambitious program for the present season. Luncheon meetings are held once a month the year round so that the accounting officers of the oil companies can become better acquainted. The evening meetings just starting take the form of serious investigative studies of the many problems met with in accounting for the petroleum industry. In the interest of thorough presentation and treatment, subjects are dealt with by subcommittees in accordance with branch classification. The general classification and subcommittee chairmen are as follows: Production, E. C. Rogers, Union Oil Co. of California; refining, R. S. Minkler, General Petroleum Corp. of California; marketing, Edward Brady, Richfield Oil Co. of California; gasoline, C. E. Spangler, Western States Gasoline Corp.; taxes, L. C. Glendenning, Union Oil Co. of California.

Speakers from outside the membership are secured from time to time to talk on special subjects of interest and value to the society. Fred Vaile, West Coast Refining Co., is general program chairman.

The society was organized in 1926 and its purpose is to develop an organization capable of being of real and permanent value to the petroleum accounting profession; and to direct its efforts toward the standardization of accounting practices in the oil industry. Membership is open to those actively engaged as accounting officers of petroleum companies, or to those whose duties consist in whole or in part of executive control of accounting of a petroleum company. Wesley Cunningham, controller, General Petroleum Corp. of California, a director of the society, is also membership chairman.

OIL MAN MENTIONED FOR MAYOR OF CHICAGO

CHICAGO, Sept. 30.—Friends of Sheldon Clark, vice president, Sinclair Refining Co., are circulating petitions to

Sheldon Clark

place his name in nomination for the position of mayor of Chicago on the Republican ticket at the primary election next February. This term will be that of the World's Fair mayor and there has been a strong movement to have a leading business man for mayor.

Mr. Clark professes entire ignorance of the action of his friends. He left for Tulsa today.

ARGENTINE CHANGES WELCOME TO OIL MEN

The recent change in the Argentine government has put a definite termination to the campaign against United States petroleum companies which developed under former President Irigoyen's administration, says a Buenos Aires cable to the New York Times.

The minister of agriculture, in installing Capt. Felipe Fliess of the Argentine Navy as the new director of fiscal petroleum workings, said that while the provisional government believes the fiscal workings should be developed to a point where eventually it will be unnecessary for Argentina to import petroleum or its by-products, he does not think the petroleum problem should serve as a political football and that whatever legislation may be desirable should be passed only after careful and serene study by recognized experts of all the factors involved and without prejudice or precipitateness. Meanwhile the Fiscal Petroleum Bureau should confine its activities to increasing production, conserving reserves, improving the efficiency of the fiscal refining plant and efficiently organizing sales.

Senor Irigoyen's followers in the Chamber of Deputies rushed through a law confiscating all foreign petroleum fields, creating a government monopoly and prohibiting the importation, transportation or sale of petroleum, gasoline or by-products by foreigners. The senate refused to vote on the law despite three vigorous messages from Senor Irigoyen.

Captain Fliess, who formerly was commandant of the Buenos Aires arsenal, previously served four years in the position to which he is now reappointed. The government oil workings reached their maximum of efficiency under his former administration. He is friendly towards United States interests and has a large number of friends among the North American residents.

REFINERY AND GASOLINE PLANT DIVISION FORMED

Announcement is made that a refinery and gasoline plant division has been formed by Black, Sivalls & Bryson, Inc., tank manufacturers and steel fabricators of oil field equipment, with general offices in Bartlesville, Okla. This new division offers a complete service to the refiner and natural gasoline manufacturer in designing, manufacturing and constructing their essential equipment. The work is supervised from the original plans to the entire plant, complete, ready to operate.

The office of the new division is at 430 South Rockford Avenue, Tulsa. Manufacture of the pressure vessel welded tanks and other equipment is conducted in the factory of the American Tank & Equipment Corp., Oklahoma City, the manufacturing subsidiary of Black, Sivalls & Bryson. The American Tank & Equipment Corp. recently moved into its new and modern factory, an all-welded building.

Seventeen engineers are employed to give service in the refinery and gasoline plant division. They include engineers who have specialized in the design and manufacture of refinery and gasoline plant equipment. Their work is supplemented by the services of the engineers employed by Black, Sivalls & Bryson and the American Tank & Equipment Corp.

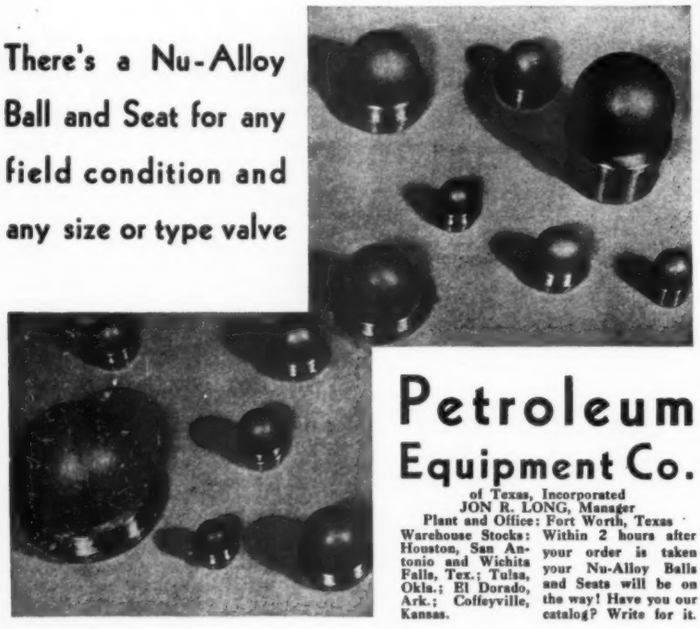
The equipment designed and manufactured includes for refiners storage tanks, agitators, acid towers, condenser boxes, heat exchangers, aeriators, stills, smokestacks, breeching, etc., and for natural gasoline plants fractionating units, bubble towers, scrubbers, nonabsorbers, absorption towers, debutanizers, storage tanks, stabilizer towers, aeriators, heat exchangers, etc.

RETURNS TO HIS OLD JOB

J. A. Morgan

J. A. Morgan is again in charge of sales for the Smith Separator Co., Tulsa. This appointment became effective October 1. Jim Morgan is one of the most widely known specialty men in the business. He was with the Smith Separator Co. from 1923 to August, 1929, leaving the organization on the latter date to engage in business for himself. Jim says he is delighted to be back with the Smith company and will be at hand to greet old friends at the International Petroleum Exposition.

There's a Nu-Alloy Ball and Seat for any field condition and any size or type valve



Petroleum Equipment Co.
of Texas, Incorporated
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Within 2 hours after your order is taken your Nu-Alloy Balls and Seats will be on the way! Have you our catalog? Write for it.

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Drop us a line and we'll give you a list of our satisfied customers.

New Crooked Hole Device Makes Use Of Copper Plating

Crooked hole problems in rotary drilling have given rise to several types of instruments being designed and perfected

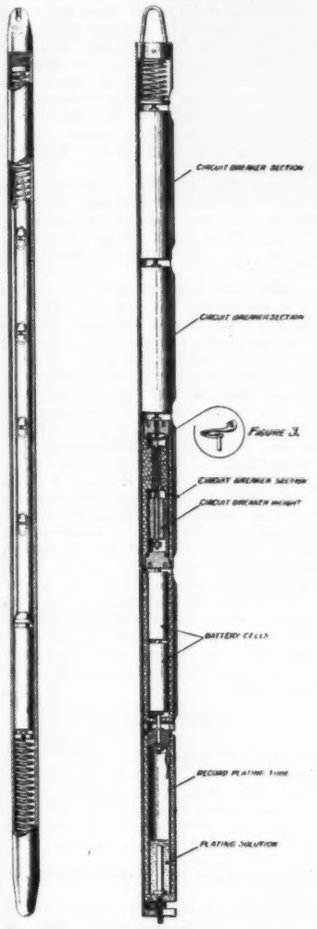


FIGURE 1. FIGURE 2.

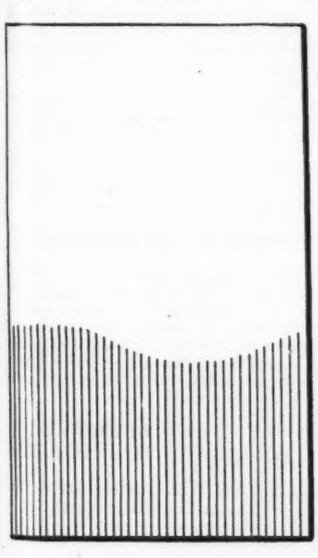


Figure 4.

for determining the angle of declination from the vertical and one of the latest pieces of apparatus for this purpose has been invented by W. G. Bottom of Tulsa. In his new instrument the recording is done by means of depositing copper upon a thin plate of metal using an electro plating process for the operation.

The Angleometer is only 3 feet 4½ inches long and 1½ inches outside diameter. It consists of an outer shell in which is suspended a set of very small dry cells such as used in the standard fountain pen flashlight, together with the special plating solution, the roll of thin metal and three circuit breakers.

The timing that causes the instrument to record the angle of the hole at any desired point is brought about by the use of an inharmonic circuit breaker. Agitation keeps one or more of the series contacts broken, thereby arresting the flow of current from the batteries.

When the instrument is brought to rest at the point where the record is desired the circuit breakers make contact which causes the current to flow through the electro plating fluid and its level is recorded by the electro plating process of depositing the copper out of the solution upon a metal plate.

The solution is noncorrosive and safe to handle and all parts of the instrument are rugged in construction which eliminates the possibilities of trouble due to rough handling. All material used is nonmagnetic and therefore not subject to disturbances due to static charges of electricity.

The accompanying cuts show the instrument in section and detail, also a type recording plate.

SLIGHTLY FIRMER TONE IN CALIFORNIA MARKET

LOS ANGELES, Calif., Sept. 27.—The refined oil market in California this week was a little firmer as far as prices are concerned but this advantage was offset to some extent by the appearance of a greater amount of spot gasoline which is being retailed at a figure considerably below the prevailing retail price structure maintained by major companies. A week or two ago this spot gasoline was sold in the retail market around 14½ cents per gallon in Los Angeles territory but when the larger companies increased retail prices 1 cent per gallon to 20½ cents per gallon in Los Angeles and 21 cents in San Francisco most of this lower priced gasoline was boosted to 15½ cents.

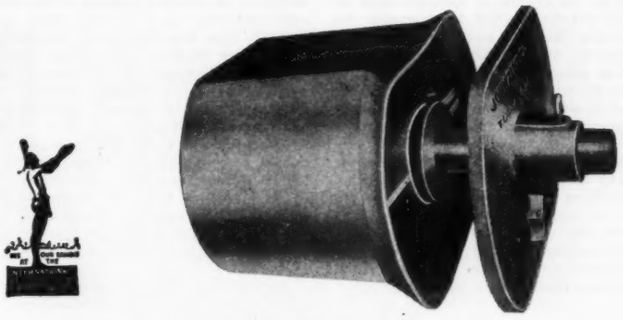
These quotations of course include the 3-cent gasoline tax and the reseller's differential. California refiners effected a further reduction in the amount of oil run to stills and this has been reflected in a substantial decline in gasoline production. During the month of August 560,345 bbls. of crude oil per day were run to stills, as compared with 566,001 bbls. in July, the previous month. Gasoline production averaged 244,200 bbls. per day in August, 12,019 bbls. per day below the output of July and 31,737 bbls. per day below the production chalked up in August, 1929.

Standard's Statement

The Standard Oil Co. of California, in an official statement, has replied to the accusations made by the United States Attorney General's office in recent litigation which resulted in the issuance of a permanent injunction against that company and 18 other defendants in the Frank Long case. The Standard's statement, which appears under the caption, Laws Against Prosperity, calls attention to the fact that "the effort made by the Standard Oil Co. of California to terminate the chaotic condition in the gasoline market, which was precipitated by the recent gas war, has met with moderate success; the policy under which that effort was made has met with widespread approval on the part not only of the oil industry, but of numerous other industries. There can be no dispute that neither the gasoline business nor any other business can prosper or live except on the basis of a reasonable profit. A reasonable return to the manufacturer is just as essential to a sound economic structure as are reasonable prices to the consumer.

"The public is as much interested in the one as in the other. It is for that reason that this company offers the greatest possible resistance to those in the trade who are determined, for one reason or another, to break down a reasonable

HEAT WITHOUT FLAME
BI-MIX GAS BURNERS



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Oklahoma Natural Gas Bldg.
Tulsa, Oklahoma

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price structure. It is for that reason that this company is unwilling to trade with them and does not want their business. In its legal aspect the company is advised that its position is unassailable. The right of one to choose his customers is undisputed, and has been clearly sustained by the courts. A company may refuse to sell its product to a reseller for the reason that his methods of reselling are unfair, or for the reason that his reselling prices are too high or too low, or for no reason at all. So long as the refusal to sell is not part of a conspiracy to boycott a dealer, so long as it is the independent, uncontrolled act of the supplying company, no law is violated—the company is no more obliged to sell than the dealer is obliged to buy. But the position of one supplier cannot solve a problem the solution of which requires the co-operation of the whole industry. Regrettably, under our antitrust laws, that co-operation cannot be had by agreement.

"There is no doubt that trade agreements looking to the maintenance of reasonable prices—reasonable for the manufacturer as well as for the consumer—would benefit both the manufacturer and the public. No tribunal is vested with the power to pass on the reasonableness of such agreements or to permit them to be made. Without them the menace of chaotic conditions continues. The fault lies with our laws. The Sherman Anti-trust Law, which prohibits contracts, conspiracies, and trusts in restraint of interstate trade, was enacted, in the language of one of the justices of the Supreme Court of the United States to the end that the people, so far as interstate commerce is concerned, might not be dominated by vast combinations and monopolies having power to advance their own selfish ends regardless of the general interest and welfare. The statute was passed at a time when monopoly threatened to absorb various industrial endeavor, and when the power that goes with monopoly threatened to be ruthlessly exercised. It is a far cry today from the conditions of 40 years ago.

"Monopoly—except in those cases of public utilities where the monopoly is sanctioned and regulated by the Government—is practically unknown in the United States today. On the contrary, highly competitive marketing conditions have resulted from an overdevelopment of our natural resources and from mass production in manufacture. The application of statutes, enacted to meet conditions of 40 years ago, to present-day conditions, and their enforcement with untempered rigor, can only cripple, as they have crippled, the advance that business may make to diminish the waste and losses that result from excess of supply. Practically every field of activity in the country today is faced with overproduction, excessive factory output and duplication of marketing facilities. Agreements to restrict production, agreements to cut down factory output, agreements to pool marketing facilities, agreements to maintain fair and reasonable prices, are prohibited where they affect our interstate commerce and by construction of the law are claimed to be illegal even where they purport to deal wholly with intrastate business."

GULF COAST MARKET SHOWING BETTER TONE

HOUSTON, Tex., Sept. 30.—Reduction in the posted bunker fuel market at Gulf Coast ports the past week so far has not been reflected in the general fuel oil quotations, in line with the cut in the posted price. Bunkering oil is quoted at $1, which is 5 cents under the previous minimum. Cargo fuel continues to be maintained at a minimum of 75 cents, although demands, outside regular outlet channels, has shown no improvement.

Improvement in the California gas oil situation, together with additional inquiries for burner oil has resulted in a better tone in Gulf Coast gas oils, although this has not been reflected in any actual strengthening of prices. Good material continues readily available around 3¾ cents minimum.

Gasolines are firm as far as price is concerned, although the general tank wagon situation has been unsettled and 7¼ cents is held as absolute minimum from Houston refineries. Pale and red oils are unchanged, price and demand having been balancing for several months.

BANKING VIEW OF OIL SITUATION SUMMED UP IN CURRENT SURVEY

If the volume of output were the sole test of the prosperity of any individual industry, production reports of the petroleum industry in so far this year would indicate that this branch of economic activity was entirely free from any depressing influences of the present business recession, states the current issue of the Guaranty Survey, published by the Guaranty Trust Co. of New York.

There has been a slight decline in the output of crude oil, the Survey continues. On the other hand, the refining branches of this industry have not proportionately curtailed their output. Crude oil run to stills at refineries so far this year is only very slightly above that of a year ago.

As this year has progressed, the demand for refined products has fallen below anticipated levels, not only because consumption needs were somewhat lower but also because in many instances the low prices encouraged consumers to refrain from making future commitments in the hope that further price declines were in order. Some producers have maintained profits at levels as good as, or better than, those last year in the face of declining prices by effecting rigid economies; but a continuation of low prices, which is considered likely unless an early reduction in output is effected, is expected to cut heavily into the profits of many refiners during the remainder of the year.

Progress Made in Curtailment

Two conclusions have been quite obvious to interested observers for some time: First, that while the haphazard nearly satisfactory reduction in output. oil deposits has been going on for many years, the co-operative efforts of the leading producers have now effected a nearly satisfactory reductions in output. Second, that despite the recent curtailment in crude oil output, the accumulated stocks on hand have enabled the refiners to persist in maintaining their production schedules dangerously above the consumption levels. The theoretical simplicity of the corrective measures necessary to alleviate this disparity is offset in its practical application both by conditions inherent in the industry itself and by the usual obstacles that confront any industry where overproduction is accompanied by a highly competitive market. Since the first well was drilled in this country in 1859, 700,000 wells have been completed, more than half of which have been abandoned.

Uncertainties Attending Future

While the near-term future of the industry is mainly dependent on the willingness of the producers of refined products to co-operate wholeheartedly in effecting a reduction in output, the long-term future will rest on the reaction of the industry to the several problems that are likely to arise as time passes. With a very limited idea of what these developments may be, it is impossible to predict the future with any degree of accuracy very far in advance.

New sources of supply may be discovered in this country and other parts of the world that will change the position of the industry in a very short period. There is always the possibility of the development of new methods in drilling that will bring to the surface deeply deposited supplies of crude oil that are now inaccessible, of commercially profitable methods of extracting oil from shales. and the like. With regard to improvement in refining methods, considerable progress has been made; and research is continually being carried on in attempts to discover processes that will enable a given quantity of the crude product to yield a larger amount of the more valuable refined materials.

Out of all the uncertainties in the petroleum industry, there is one factor that is widely conceded, namely, that the oil existing under the surface in this country, if recovered in proportion to economic needs and refined by the most efficient methods, can bring profit to the petroleum industry in all its branches and contribute in considerable measure to the prosperity and pleasure of the American people for some time to come.

This consideration, of course, by no means justifies or condones the heedless exploitation of a valuable and irreplaceable natural resource. Sooner or later it will be necessary for this country to import its oil or to produce liquid fuel from coal, oil shale, or some other source, probably at an increased cost. In the meantime, the wisest course will be to continue the use of our petroleum reserves with reasonable regard for the needs of the future.

CLERK ON RESIGNING CRITICIZES SECRETARY

WASHINGTON, D. C., Sept. 29.—Secretary Ray Lyman Wilbur of the Department of the Interior, has been charged with favoritism toward large oil companies that have attempted to obtain title to valuable oil shale lands in Colorado by Ralph S. Kelley, chief of the field division of the General Land Office at Denver, in a letter announcing his resignation. This letter was made public by Mr. Kelley who says in the past five years he has submitted a large number of exhaustive reports showing in great detail the activities of these oil companies and says he can scarcely recall an instance during this period that the demands of the oil men have not received favorable consideration by the Secretary nor instances in which the rights of the public have been upheld.

Secretary Wilbur today stated that the resignation of Mr. Kelley and the letter of criticism had come as a surprise in view of the fact that July 7 Mr. Kelley was ordered by the Secretary to come to Washington from Denver to take charge of this very work and has not reported to the General Land Office, August 5 and worked about a month during the secretary's absence.

Secretary Wilbur has declined to accept the resignation of Mr. Kelley and has directed him to immediately file the names of companies he refers to in his letter with dates and nature of transactions referred to. Mr. Kelley has been suspended.

The Interior Department states that no leases for oil shale have been issued under this administration and a detailed statement is made concerning the Department's practice and the legal status of oil conservation litigation and legislation.

BAKER-GLENDIVE LINE

CASPER, Wyo., Sept. 27.—The first link of the Montana to Minneapolis gas line is carrying gas from the Baker-Glendive Field in eastern Montana to Williston, N. Dak. The second link will be from Williston to Minot, N. Dak., and this line was approved by a group of officials of the Dakota Montana Power Co. and the Minnesota Northern Power Co., who stopped off in Minot on their way from St, Paul to Great Falls. The statement was made that the new link would probably be laid next season and that a permit was already applied for to the North Dakota Board of Railroad Commissioners. The city of Minot was promised natural gas by 1931.

Late Fields

(Continued from Page 94)

committee is working on the new schedule.

The production from the Oklahoma City Pool was 128,147 bbls. from 76 wells with a total of 573 wells completed in the field.

Several new locations were announced in the northern and western part of the Oklahoma City Pool Monday, September 29. Work was under way on those announced the last part of the week. Due to the completion of large wells on the west and north edge of the field several old locations are being rigged up and work is to start soon on the drilling of these tests.

Hall & Briscoe's No. 1 Mueller, CSL S half NW, Section 2-11-3w, flowed 2,260 bbls. the first one and one-half hours. The gas volume was estimated at 182,000,000 feet. The sand was found from 6,210-6,545 feet.

Indian Territory Illuminating Oil Co.'s No. 1 Wheeland, NW cor. NE NE, Section 10-11-3w, flowed 475 bbls. the first 25 minutes and was shut in. The sand was found at 6,300-6,552 feet.

Tom Slick Oil Co.'s No. 1 Hightower, NE cor., Section 10-11-3w, flowed 5,355 bbls. the first two and three-quarters hours from sand at 6,323-6,502 feet. The gas was estimated at 43,000,000 feet.

Tom Slick Oil Co. and others' No. 5 Baker, C NW NW, Section 1-11-3w, flowed 6,547 bbls. the first 16 hours. The sand was found at 6,080-6,420 feet.

In the Carr City Pool, Amerada Petroleum Corp.'s No. 1 Tiger, in Section 3-8-5, flowed 1,015 bbls. in 17 hours.

Amerada Petroleum Corp.'s No. 1 Morris, in Section 29-9-6, southeast of East Earlsboro Pool, had the Sylvan shale at 3,980 feet, and was drilling deeper at 4,005 feet. It is believed the test is running lower on structure than the discovery well.

WEST TEXAS

FORT WORTH, Tex., Sept. 30.—Fuhrman Petroleum Co.'s No. 1 Ford, Section 16, Block A-43, Andrews County, is shut down at 4,340 feet. Swabbing it made one 10-bbl. head of oil when tools were pulled out of the hole.

ESTABLISH FIVE-DAY WEEK

NEW YORK, Sept. 27.—Standard Oil Co. of New Jersey will place 1,000 employes of its Bayonne, N. J., works on a five-day week basis, beginning October 4. This arrangement, according to a notice posted at the plant by C. F. Smith, works manager, will continue until further notice.

The employes affected by the order are connected with the mechanical and electrical departments, and constitute about 25 per cent of the plant personnel. "This curtailment of operations," the notice states, "of course does not disturb the present schedule of hourly rates."

ESTIMATE OF 1930 PRODUCTION

World crude oil production in 1930, estimated by Valentine R. Garfais of Henry L. Doherty & Co., will be 1,444,000,000 bbls., a decrease of about 44,000,000 bbls. from 1929 with the United States production at about 937,000,000 bbls. or 69,000,000 below 1929, although 36,000,000 over 1928.

INDEPENDENT APPROVES STOCK SALE TO PHILLIPS

Stockholders of the Independent Oil & Gas Co. at a meeting held in Tulsa Tuesday afternoon approved the sale of the company's stock to the Phillips Petroleum Co. A total of 1,056,196 shares or approximately 80 per cent of the Independent stock were represented at the meeting. The final approval of the sale follows an agreement entered into by officials of the two companies last month.

No announcement was mac'e as to future changes in personnel brought about by the consolidations of the two companies. Headquarters for the Phillips company will continue at Bartlesville, Okla.

For Running Tools Under Pressure with Complete Control

ALL-PURPOSE and TYPE X Control Head equipment are in use at Lovell, Big Lake, Yates Pool, Graham, Chandler, Oklahoma City, etc., for "lubricating" tools under pressure - - - with complete control at all times. TYPE X is used for nominal pressures and ALL-PURPOSE equipment for high pressures.

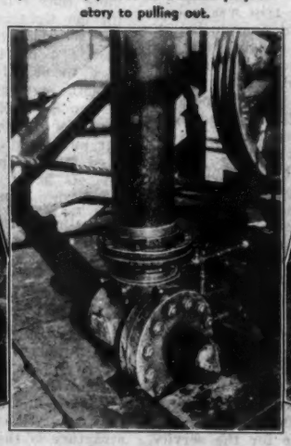
See our Exhibit at Booths 51 and 52 Oklahoma Building during the International Petroleum Exposition.

THE OIL WELL IMPROVEMENTS CO.
Tulsa, Okla.

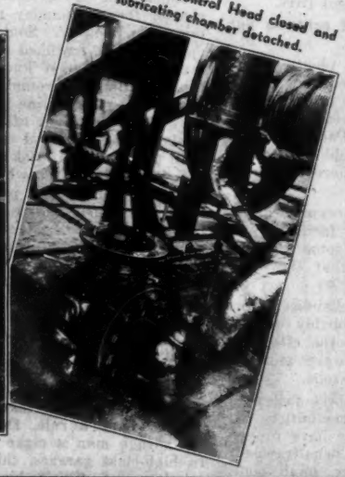
ALL-PURPOSE Control Head and All-Purpose Oil Saver on Oklahoma City well - - - - Tools in hole and drilling

Type "X" Control Head on Oklahoma City well. Tools drilling.

Lubricating Chamber in position with pressure by-passed to chamber preparatory to pulling out.



Tools out. Control Head closed and lubricating chamber detached.



O.W.I. Co. "All-Purpose" and Type "X" CONTROL HEADS

Of Interest to Sales Departments

Tire Manufacturer Predicts Failure For New Sale Plan

Commenting on the recent announcements of several oil marketing companies, William O'Neill, president of the General Tire & Rubber Co., one of the large tire manufacturers with headquarters in Akron, predicted failure for the new plan of combining tire and oil sales.

"At various times during the past 20 years any number of different schemes for distributing tires have been proposed," Mr. O'Neill said. "Each of them, at the time, was hailed by a few persons as the final way that tire distribution was to be handled.

"In 1913-14-15 the hardware jobber was supposed to be the coming factor in distributing tires. Then it was the wholesale grocer and the wholesale druggist. Later it was attempted through mail order houses, such as Butler Brothers. All of these systems of distribution have dwindled in importance.

"The oil companies use the same old method of figuring that was used earlier by the wholesale hardware companies. A hardware concern would figure that, as it had 400 salesmen, if each salesman sold only one tire a day, that would mean total sales of 400 tires a day.

"The oil companies figure that, if they have so many thousand filling station operators, they will sell so many thousands of tires if each operator sells only one tire a day. But each operator will not sell a tire a day. Often he will not sell one tire in a week.

Sales Methods

"It is claimed that the contacts which the gas and oil filling station proprietor makes will enable him to sell tires.

"A barber has plenty of contacts but he can't sell Packard cars.

"Moreover, a barber has plenty of opportunity to talk to his customers and he usually takes advantage of it. Many of his contacts are with wealthy people. If he could just sell one Packard car a week, think how that would reduce his overhead! But he needs more than contacts to sell cars.

"The oil companies have expanded too much in their distribution facilities and they are looking about for some way out to plus their volume so that they can reduce their overhead.

"The attempt to merchandise tires through filling stations probably will be just about as peaceful as the effort to retail them through hardware stores—and for about the same reasons.

"Although hardware jobbers failed to become the final distributing outlets for tires in a few sections they have proved to be a satisfactory outlet, usually where the jobber supplies a very small community which can be reached only at a very high cost by the tire factories' direct branches.

"Naturally the plans of the oil companies will affect the business of the mail order houses, for their methods are much the same. Both labor under the handicap of inexperienced operators and lack of facilities for adequate service.

"A commodity that costs as much as an automobile tire cannot finally be merchandised successfully with the methods used to retail oil and gasoline."

RED CIRCLE COMPANY

The Red Circle Oil Co. has been organized in Milwaukee, Wis., to carry on a general jobbing business in refined oils. According to an official announcement five service stations will be built in addition to bulk station facilities.

STATIONS OF CONTROLLED DEALER DO NOT SATISFY CUSTOMER NEEDS

By Norman M. Day
Vice President, Pennzoil Co. of California

I had occasion not long ago to interview a dealer who had a short time prior become a 100 per cent dealer due to a lease and agency arrangement he had concluded with one of the major companies. He did not appear to be altogether satisfied, and he indicated that his volume of business had shown a marked decrease, regardless of the amount of effort he expended. Said he, "I am in a good location; and up to the time I made the change, I had what I believed to be a friendly and consistent clientele. Yet, under the new management, my receipts show a decrease instead of the progress I am accustomed to. What is the explanation?"

I said to him that obviously there must be some answer, but the answer was not on the surface, and I explained to him that he would have to dig for it. I then began to analyze the situation for him in substantially these words:

A service station is a place, where, as the name implies, a service is rendered to the public. So, in attempting to answer the question, let us not look at the problem from the standpoint of its advantages to the oil marketer, who wishes to control his retail outlets—let us look at it from the more important standpoint of the man who lays his change on the counter—the man who thereby makes the very existence of the dealer and the marketer possible. Shake hands with the dominating public in the whole picture—Mr. John Public!

'Way back in the dim past, automotively speaking, or 20 years ago by the calendar, the job of stocking the family chariot for the Sunday trip was a complicated maneuver. Sometime during the morning, Dad cranked up and trundled over to the nearest known garage. He drove in, swung around, and backed up as close to the gasoline pump as possible. It was a one-gallon affair, generally of dubious character and contents.

In response to a brisk honking, a grimy individual finally crawled out of a pit, slouched over to the pump and grudgingly began grinding gas into an almost five-gallon bucket. Meanwhile, Dad was struggling with the front seat cushion, getting it out of the car and unscrewing the cap from the cunningly concealed gasoline tank. Then he helped Grimy look around the garage for the funnel with the chamois strainer.

Fifteen minutes was race track time for "shammying" a tankful of gas, reinstating the front seat, cranking up and pulling out into the main line, ready to go. And, as a rule, Dad felt he owed the garage man a cigar for the service. In high-class garages, this gave him the privileges of filling his tires, without charge, from the compressed air tank.

Unquestionably, the man who invented the service station should have his birthday remembered by the motoring public. Certainly, the hundred-odd thousand stations that dot the country today are visible evidence that he had a real idea.

Service Station Function

Just what is the function of the service station? It depends on the viewpoint. Some operators regard it as a vehicle for dragging in bread and butter. easier than this important job can be done through brick laying or ditch digging. Others use it as a leader to draw in customers to whom they want to sell some special line of merchandise. Still others regard the service station as a department of a regular, well-balanced business—automotive supplies and service.

The big gasoline marketers have a still different viewpoint on the function of the service station. They regard it as part of their sales structure. They feel that, to resist the encroachments of competitive brands and to maintain their positions, they would like very much to have nothing but their own products sold in at least 75 per cent of the service stations through which they reach the public. They fondly hope that if they could just reach that ratio of company-owned or company-controlled stations most of their trouble would be over.

But what of John Public? What's his idea about the service station? He is the man who pays all the bills. Surely his viewpoint is worth considering. Well, up to recent times, John Public has been a little hazy in his own mind as to just what he really did want. He used to think it was pretty slick to be able to drive right in alongside the pump, get her filled up, then pull around to the air hose where he could pump up his own tires. The kind of gasoline and oil he got was not so important. He did not know much about them and took it for granted that the service station man was doing the right thing by him.

All that was quite a while back. Today, John Public is not quite as easy-going. He has found out some things for himself, and has learned of others through some pretty well authenticated stories he is willing to believe. Good highways, for one thing, taught him a lot. A few years back poor roads ate up his tires, shook off tail lights and grease cups. What was the sense of doing any more than replacing lost parts and having her tightened up once in a while?

Since then, times have changed. John's car is a lot better automobile than it used to be. It is built to run fast on smooth highways. John found out that he can drive 50 miles an hour for a distance of 1,000 miles without doing the car any harm. Furthermore, there is no need for a trip to the repair shop when he gets home. But experience has also taught him that if his car is to go right on performing for tens of thousands of

(Continued on Page 429)

NEW JERSEY STANDARD TO ERECT UNUSUAL STATION

WASHINGTON, D. C., Sept. 30.—The Standard Oil Co. (New Jersey) has had its plans approved by the Fine Arts Commission for the erection in this city of a headquarters building and gasoline service station of classic design. This structure is the first to be approved for the erection of any business house of classic design adjacent to the group of government palatial offices along historic Pennsylvania Avenue.

It will occupy a conspicuous site near the United States Capitol along the route set aside for ceremonial processions in connection with presidential inaugurations or other ceremonial functions under the auspices of the Government. In appearance the building resembles government structures both in design and size.

The first or ground floor will be provided with entrances to an elaborate service station without any of the architectural characteristics of service stations heretofore familiar to the public. The other five stories will be for offices and accounting purposes. In appearance strongly resembling the beautiful Senate office building, this structure is declared to be the most palatial service station ever planned in the country.—C. E. K.

CONSIDER DISPOSAL OF WASTE CRANKCASE OILS

WASHINGTON, D. C., Sept. 30.—The Government of the District of Columbia has circularized oil companies here inquiring whether they could favor the collection of their used crankcase oil by a municipal contractor as a means of disposing of this oil at no cost to them. The large companies operating 80 per cent of the service stations have shown no interest in this suggestion.

Several years ago crankcase oil was classed as refuse and there was much complaint that it became a menace to the public by being disposed of in sewers. It was to avoid this difficulty that an ordinance was adopted forbidding such disposition of the refuse crankcase oil and the district commissioners began an inquiry to determine the possibility of employing a contractor whose duty it would be to collect such oil, which was to be refined in a proposed municipal crankcase oil plant the product of which was to be consumed by the Government itself.

That plan did not proceed very far and lately inquiry has been undertaken to have such used oil collected, allowing the contractor to sell it or put it through a re-refining process as a means of paying for the service. The fact is, used crankcase oil has passed the stage of being a refuse product. It is coming into a class of by-product that has a money value. At this time several small service stations unable to handle such oil by re-refining it are selling it at their stations at a price as high as 2 cents a gallon with removal at the expense of the purchaser.—C. E. K.

SINCLAIR ESTABLISHES DISTRICT SALES OFFICE

Starting October 1, the southwestern district sales offices of the Sinclair Refining Co. will be located at Fort Worth. The new arrangement involves a consolidation of the Sinclair and the former Pierce properties which were recently acquired by the Sinclair company. The Sinclair company took over the Pierce bulk and service stations in Texas and other southwestern states several months ago.

W. T. Dinkins, formerly with the Pierce corporation, will have charge of the Fort Worth office. Approximately 400 employes in St. Louis, Tulsa and other points are being transferred to Fort Worth. The offices are located in the building recently acquired by the Sinclair companies located at Fifth and Main Streets. Offices of the Sinclair Oil & Gas Co. are located in the same building.

Although workmen have been employed to clean up the yard of the Pierce refinery at Fort Worth, the Sinclair company does not at this time intend to resume operations at the plant. The refinery which has been shut down for several years is connected by pipe line with southern Oklahoma fields. This line at present is being used by the Magnolia Petroleum Co. which has two refineries at Fort Worth.

The Sinclair Refining Co. has also completed the transfer of its bulk and retail department in Oklahoma from Tulsa to Oklahoma City.

GENERAL BUYS STATIONS

Standard Oil Co. of New York has further widened its marketing activities through the acquisition this week of A. M. Mortenson, Inc., independent petroleum marketing company with headquarters at San Jose, Calif. The purchase of this company was effected through General Petroleum Corp., a subsidiary.

Give Your Plant An Even Break

with

DEEP-ROCK ABSORPTION OILS

The Operating Department has enough troubles, without even considering the troubles which arise from using inadequate absorption oil.

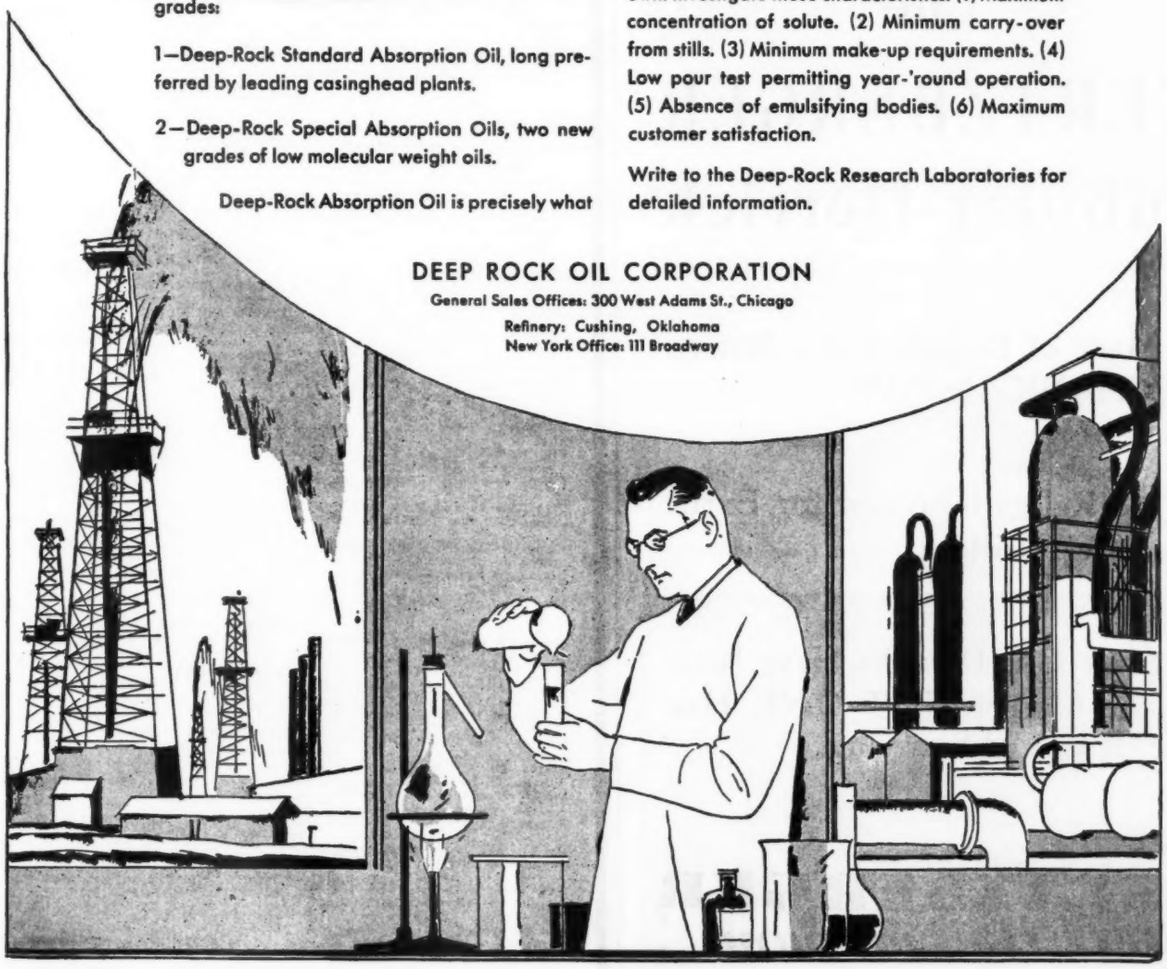
Eliminate one pernicious source of trouble by using Deep-Rock Absorption Oils . . . made in three grades:

1—Deep-Rock Standard Absorption Oil, long preferred by leading casinghead plants.

2—Deep-Rock Special Absorption Oils, two new grades of low molecular weight oils.

Deep-Rock Absorption Oil is precisely what the name describes. It isn't just a mongrel cut from the crude battery . . . or an accidental back trap from a fractionating tower. From start to finish, the entire processing is checked repeatedly. Deep-Rock Absorption Oil has a definite character all its own. Investigate these characteristics: (1) Maximum concentration of solute. (2) Minimum carry-over from stills. (3) Minimum make-up requirements. (4) Low pour test permitting year-'round operation. (5) Absence of emulsifying bodies. (6) Maximum customer satisfaction.

Write to the Deep-Rock Research Laboratories for detailed information.



DEEP ROCK OIL CORPORATION

General Sales Offices: 300 West Adams St., Chicago

Refinery: Cushing, Oklahoma

New York Office: 111 Broadway

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122 Ft. Rotary Derrick
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1 Made of Double Extra Strong MECHANICAL PIPE.

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3 Since Our Derricks Have Been on the Market NOT ONE Has Ever Required Servicing.

WERTZBERGER
Derrick Company
Thompson Building TULSA, OKLAHOMA

WILDCAT OPERATIONS IN KANSAS

(Continued from Page 98)

DICKINSON COUNTY

Severs et al's No. 1 Lavengood, NE SW Sec. 13-13-2 ....Drlg. 2,410 ft.
Kruger et al's No. 1 Diche, C NW NE NE Sec. 17-13-4 ....Shut down 2,935-43 ft.; water
E. N. Morgan's No. 1 Whithair, NW SE Sec. 9-12-1 ....Drlg. 3,300 ft.

ELLIS COUNTY

Central Commercial Oil Co.'s No. 1 Helms, SE cor. NE Sec. 2-12-20w ....Shut down 3,705 ft.
Rush Oil Co.'s No. 1 Gatewood, NW cor. NW Sec. 4-15-20w ....Drlg. 3,815 ft.

ELK COUNTY

Aladdin's No. 1 Donnell, NE SE SW Sec. 26-29-10 ....Drlg. 1,760 ft.
Croft & Frazier's No. 1 Keys, SE NE Sec. 26-31-10 ....Shut down 1,939 ft.

ELLSWORTH COUNTY

Milton et al's No. 1 Kester, SW NE Sec. 6-14-9w ....Rig on ground.
Aladdin and Carter Oil Co.'s No. 1 Barecky, C NW Sec. 3-16-10w ....Rig.
Slick et al's No. 1 Hecken, NW cor. Sec. 25-17-10w ....8,000,000 ft. gas 2,980-82 ft.

FORD COUNTY

Swain et al's No. 1 Kenthorne, C NW Sec. 21-25-24w ..Cleaning out 3,775 ft.

FRANKLIN COUNTY

Empire Oil & Ref. Co.'s No. 1 Wasson, C SE SE Sec. 34-15-18 ....Drlg. 970 ft.

GOVE COUNTY

Johnson and Atlantic's No. 1 Wright, SE NE Sec. 11-12-27w ....Shut down 800 ft.
Valerius & Baucher Oil Co.'s No. 1 Todd, NW cor. Sec. 24-13-27w ....Drlg. 4,125 ft.

GRAHAM COUNTY

Gulf Coast Oil Co.'s No. 1 Johnson, C S half Sec. 27-8-25w..Shut down 4,370 ft.
Naylor et al's No. 1 St. John, NW SE SE Sec. 27-8-25w..T. D. 5,937 ft.; abandoned.

GRANT COUNTY

McKenna et al's No. 1 Sullivan, NE cor. Sec. 12-29-38w..Shut down 50 ft.

GREENWOOD COUNTY

Staats et al's No. 1 Swan, NE NW Sec. 3-25-12 ....Rig.
Harwood Oil Co.'s No. 1 Log, SW NE Sec. 20-25-10 ....Drlg. 2,130 ft.
Bundy, Smith & O'Neil's No. 1 Ford, NE NW Sec. 28-25-13 ....Drlg. 1,115 ft.
F. Konkay et al's No. 1 Rock, NW NE NE Sec. 7-27-12..Shut down 1,836 ft.

HARPER COUNTY

Atkinson et al's No. 1 Misak, SE cor., Sec. 25-34-6w ....Shut down 2,700 ft.
Beeler et al's No. 1 Bear, C NE Sec. 21-31-6w ....Shut down 1,830 ft.

KINGMAN COUNTY

Skelly Oil's No. 1 Miles, NE cor. Sec. 30-27-10w ....Drlg. 550 ft.
Slick, Pryor & Lockhart's No. 1 Wetherall, NE SW Sec. 36-29-6w ....Shut down 4,157 ft.

KIOWA COUNTY

Phillips-Prairie's No. 1 Bean, NE SE Sec. 10-30-17w ....Drlg. 3,959 ft.
McKenna et al's No. 1 Ralson, C NE Sec. 14-28-20w ....Rig.

LYONS COUNTY

Griffith et al's No. 1 King, NW cor. Sec. 8-19-10 ....Shut down 910 ft.

MARION COUNTY

Magnolia Pet. Co.'s No. 1 Davis, SE NW Sec. 18-21-2 ..Drlg. 2,860 ft.
Dixie and Arkansas Fuel's No. 1 Hacker, NW NE Sec. 6-17-1 ....Shut down 2,720 ft.
Marshall et al's No. 1 Higgins, NE cor. Sec. 33-19-5 ....Rig.

MARSHALL COUNTY

Swicker & Sincox's No. 1 Remple, C N half NW Sec. 22-4-9 ....Shut down 1,245 ft.
Brazier et al's No. 1 Runkel, SE NW Sec. 13-2-6 ....Shut down 50 ft.

McPHERSON COUNTY

Perry et al's No. 1 Unruh, SE NE SE Sec. 27-20-2w ....Location.
Aladdin Pet. Co.'s No. 1 Larson, C NW Sec. 22-18-4w ..Rig on ground.

MORTON COUNTY

Argus Prod. Co.'s No. 1 Plummers, C NE Sec. 11-29-41w ....Drlg. 665 ft.
Hydraulic Oil Co.'s No. 1 State Land, NW SE Sec. 22-24-43w ....Shut down 3,200 ft.

MORRIS COUNTY

Pratt et al's No. 1 Whiting, NW SW SW Sec. 34-16-6 . Shut down 250 ft.
Henderson et al's No. 1 Selsman, SW SE Sec. 24-16-9 ..Rig.
Urschell et al's No. 1 Scott, NE NW Sec. 6-16-6 ..... Shut down 2,420 ft.

OSAGE COUNTY

Riggs & Smith's No. 1 Wood, SE NW Sec. 21-14-15 ... Shut down 410 ft.

PAWNEE COUNTY

Phillips' No. 1 Cuthbertson, NE cor. Sec. 27-20-18w ... Spudding.

PRATT COUNTY

Wilcox O. & G. Co.'s No. 1 Bappin, SW NW Sec. 7-26-16w ....Fishing 4,353-95 ft.; water

RENO COUNTY

Braden et al's No. 1 Thersen, SE NE Sec. 6-22-4w ....Drlg. 1,920 ft.
Alco Royalty's No. 1 Kinney, SE cor. Sec. 16-22-7w ....Drlg. 2,740 ft.
Shell Pet. Corp.'s No. 1 Popp, NW cor. Sec. 11-25-5w ..Drlg. 2,112 ft.
E. L. Study and H. L. Turner's No. 1 Haury, NE NW Sec. 1-23-4w ....Shut down 3,313-33 ft.; 22,000,000 ft. gas.
Phillips Pet. Co. and Tom Palmer's No. 1 Harsch, NE SE Sec. 14-26-5w ....Abandoned 4,108 ft.
United Pet. Co.'s No. 1 Houston, NW cor. Sec. 4-22-10w ..Sand 3,545-47 ft.; water; shut down.
C. A. Cheney and M. M. Valerius' No. 1 Stevens, C NE SE NE Sec. 6-26-7w ....Shut down 4,230 ft.

RICE COUNTY

Jasper & Beschka's No. 1 Cupp, SW NE Sec. 22-18-9w..Drlg. 800 ft.
United Pet. Co.'s No. 1 Willman, NE cor. Sec. 29-21-9w..Drlg. 2,090 ft.
Hershey Golden & Skelly's No. 1 Brandenstein, Sec. 10-19-10w ....Drlg. 3,267 ft.
Tatlock et al's No. 1 Ploog, C SW SE Sec. 33-18-9w ....Silicious lime 3,252-53 ft.; flowing 30 bbls. an hr. when shut in

ROOKS COUNTY

Streeter-Stearns' No. 1 Conger, SE NW NE Sec. 16-10-16w ....Drlg. 1,600 ft.

RUSH COUNTY

Prairie et al's No. 1 Lecker, NW SW SW Sec. 5-16-18w..Drlg. 3,222 ft.
Syndicate Oil Co.'s No. 1 Lannen, C SW Sec. 11-18-16w..Location.
McPherson O. & G. Co.'s No. 1 Brack, C NW Sec. 24-17-16w ....Drlg. 3,944 ft.
Syndicate Oil Co.'s No. 1 Mohr, C SW Sec. 2-18-16w ....Abandoned 3,763 ft.

RUSSELL COUNTY

Empire Oil & Ref. Co.'s No. 1 Sherwood, SE NW NW Sec. 21-14-13w ....Rig on ground.
Austin Drlg. Co.'s No. 1 Rochfellow, SE cor. Sec. 6-13-12w ....Shut down 1,884 ft.
Gilbreath et al's No. 1 Bratton, C NE Sec. 33-11-13w ..Drlg. 2,155 ft.

SEDGWICK COUNTY

Buck et al's No. 1 McNananan, NE NW NW Sec. 2-29-1..Rig.
Newman et al's No. 1 Bawly, SE NW NE Sec. 2-27-2 ..Drlg. 3,311 ft.

SALINE COUNTY

Twin Mounds Oil Co.'s No. 1 Weis, C W half NE NW Sec. 20-13-4w ....Shut down 2,125 ft.

STAFFORD COUNTY

Boucher Oil's No. 1 Groves, NE cor. Sec. 9-22-11w ....Fishing 2,930 ft.
Midwest's No. 36 Richardson, SE cor. Sec. 36-22-12w ....5,000,000 ft. gas 3,542-45 ft.; 3,600 ft. oil in hole; swabbed 287 bbls. 24 hrs.

STEVENS COUNTY

Argus Prod. Co.'s No. 1 Olsen, C SE Sec. 1-32-38w ....Rigging up standard tools 2,470 ft.
Argus Prod. Co.'s No. 1 Davis, C SW Sec. 31-32-38w ....Rigging up standard tools 2,365 ft.
Argus Prod. Co.'s No. 1 Headrick, C NW Sec. 9-35-37w ..Drlg. 2,770 ft.
Argus Prod. Co.'s No. 1 Wiley, C NE Sec. 4-35-37w ....Completed 2,618-2,812 ft.; 4,500,000 ft. gas.
Argus Prod. Co.'s No. 1 Ridpath, C SE Sec. 27-34-37w ...Completed 2,610-2,817 ft.; 5,500,000 ft. gas.

Argus Prod. Co.'s No. 1 Gibbons, C SE Sec. 29-34-37w ....Drlg. 2,670 ft.
Argus Prod. Co.'s No. 1 Knier, C SW Sec. 37-34-37w .....Completed 2,675-2,865 ft.; 2,000,000 ft. gas.
Braden et al's No. 1 Theisen, SE NE Sec. 6-22-4w .....Rig on ground.
Mangle et al's No. 1 Youngren, C SE NW Sec. 24-32-39w .....Shut down 2,523 ft.
McNabb and Mid-Kansas' No. 1 Rhinehart, C NE Sec. 23-32-39w .....Rig.
McNabb et al's No. 1 Porter, Sec. 4-31-37w .....Completed 2,540-2,802 ft.; 4,500,000 ft. gas.
W. Sidwell et al's No. 1 Kelly, SW cor. NE Sec. 16-34-38w .....Abandoned 1,365 ft.

SUMNER COUNTY

Magnolia Pet. Co.'s No. 1 Shriver, NW SW Sec. 9-23-2 ..Drlg. 2,820 ft.
Disney et al's No. 1 Fay, C E half SE Sec. 14-34-1w ....Rig.
Davidson et al's No. 1 Strickland, SW cor. SE Sec. 12-35-1w .....Rig.

WASHINGTON COUNTY

Sincox et al's No. 1 Penwell, NW SE NE Sec. 16-3-3 ....Shut down 510 ft.

LOUISIANA-ARKANSAS PROVEN AREAS

(Continued from Page 100)

CADDO PARISH—OIL CITY

The Texas Co.'s No. 73 Levee Board, 1,642 ft. E, 780 ft. N, SW cor. SW SE, Sec. 27-21-16 .....Location.

CADDO PARISH—PINE ISLAND

Shreveport Oil Corp.'s No. 1-A Muslow, 150 ft. S, 150 ft. E, NW cor., Sec. 32-21-15 .....Drlg. 1,450 ft.

DE SOTO PARISH—HOLLY

Standard Oil Co.'s No. 3-A Farmer, 330 ft. N, 330 ft. W, SE cor. NW NE, Sec. 5-13-13 .....Drlg. lime 2,753 ft.

LA SALLE PARISH—URANIA

Montugu Oil Co.'s No. 9 Zenoria Lbr. Co., 660 ft. W, 200 ft. S, NE cor., Sec. 10-9-1e .....Location.

MOREHOUSE PARISH

Bahan & Bahan's No. 4 Feazel, 900 ft. W, 330 ft. S, NE cor., Sec. 2-20-4 .....Location.
Grecian Bend Gas Co.'s No. 1 J. D. Sandidge et al, 600 ft. W, 1,980 ft. N, SE cor. NE, Sec. 2-20-4 .....Location.
Greenwood Prod. Co.'s No. 1 Burrell, 713 ft. W, 1,083 ft. N, SE cor. NE, Sec. 21-20-4 .....Cmtd. 6-in. 2,056 ft.
La. G. & F. Co.'s No. 26 Crossett, 645 ft. E, 574 ft. S, NW cor., Lot 9, Sec. 33-21-5.....Milling 6-in. csg. 2,195 ft; T.D. 2,380 ft.
Ouachita Nat. Gas Co.'s No. 2 Cole, 660 ft. S, 613 ft. W, NE cor., Sec. 13-20-4 .....Derrick.
Ouachita Nat. Gas Co.'s No. 7 Sandidge, 1,047 ft. N, 694 ft. E, SW cor. NW, Sec. 24-20-4 .....Cmtd. 9-in. 818 ft.
Southern Carbon Co.'s No. 13 Tensas, 660 ft. S, 1,320 ft. W, NE cor., Sec. 4-20-4 .....Cmtd. 6-in. 2,082 ft.

OUACHITA PARISH

Amalgamated Co.'s No. 1-B Kate Cole, 660 ft. N, 660 ft. E, SW cor. NE SW, Sec. 25-20-4 .....Cmtd. 6-in. 2,127 ft.
C. W. Pierson's No. 1 Haynes, 1,297 ft. N, 906 ft. W, SE cor., Sec. 9-17-3 .....Drlg. 1,360 ft.
Greenwood Prod. Co.'s No. 1 White, 1,306 ft. W, 660 ft. N, SE cor. NW NE, Sec. 36-19-3.....Drlg. in; 2,142 ft.
Industrial Gas Co.'s No. 3 fee, 541 ft. S, 531 ft. E, NW cor. NE SW, Sec. 6-18-4 .....Drlg. 2,160 ft.
Jordan Drlg. Co.'s No. 7 Cole, 265 ft. S, 1,459 ft. W, NE cor., Sec. 49, in Sec. 50-18-4 .....Location.
Jordan Drlg. Co.'s No. 1 School, 216 ft. S, 244 ft. W, NE cor. NW, Sec. 16-18-4 .....Derrick.
Pipes & Mack's No. 2 Union Gas Products Co., 296 ft. W, 528 ft. N, SE cor. SW, Sec. 7-18-5.....Location.
United Carbon Co.'s No. 6 Spade, 1,180 ft. S, 140 ft. E, NW cor., Sec. 27-19-4 .....Location.

RICHLAND PARISH

W. C. Feazel's No. 1 R. B. Simon, 2,406 ft. W, 2,020 ft. S, NE cor., Sec. 11-16-6 .....Rig moved; derrick.
Franklin O. & G. Co.'s No. 1 Thomson, 660 ft. N, 165 ft. W, SE cor. NE, Sec. 14-16-6 .....Location.
Greenwood Prod. Co.'s No. 1 Boughton, 1,980 ft. E, 660 ft. N, SW cor., Sec. 33-16-6.....Began drlg. Sept. 18; cmtd. 12½-in. 158 ft; 9-in. 870 ft.
Palmer Corp.'s No. 1-B Boykin, 177 ft. S, 787 ft. E, C, Sec. 33-17-6 .....Location.
Palmer Corp.'s No. 1 Rhymes-Earle, 1,980 ft. S, 1,394 ft. W, NE cor., Sec. 36-17-5.....Reported 12 and 9-in. cmtd. in error; rig up.
Palmer Corp.'s No. 2 Rhymes-Earle, 3,486 ft. W, 1,327 ft. S, NE cor., Sec. 36-17-5 .....Began drlg. Sept. 12; cmtd. 12½-in. 156 ft; 9-in. 895 ft; 6-in. 2,300 ft.
Palmer Corp.'s No. 10 Rhymes-England, 1,245 ft. S, 700 ft. W, NE cor., Sec. 7-16-6 .....Rig up.
Palmer Corp.'s No. 11 Rhymes-England, 2,033 ft. W, 660 ft. S, NE cor. NE, Sec. 12-16-5 .....Cmtd. 6-in. 2,300 ft.
Southern Carbon Co.'s No. 1 J. A. Clements, 1,320 ft. S, 1,980 ft. W, NE cor., Sec. 10-16-6 .....Derrick.
Southern Carbon Co.'s No. 1-B Hallock, 1,622 ft. N, 990 ft. W, SE cor. NW, Sec. 1-16-6 .....Cmtd. 6-in. 2,285 ft.
Southern Carbon Co.'s No. 1 G. Harris, 10 ft. S, 660 ft. W, NE cor., Sec. 10-16-6 .....Began drlg. Sept. 19; cmtd. 12-in. 159 ft.
Southern Carbon Co.'s No. 1-C Hemler, 1,164 ft. S, 888 ft. W, NE cor., Sec. 14-16-6 .....Location.
Southern Carbon Co.'s No. 2-C M. L. McCoy, 1,880 ft. N, 5,024 ft. E, SW cor., Sec. 1-16-6 .....Drlg. 2,135 ft.
Southern Carbon Co.'s No. 1-B H. L. Thomason et al, 2,310 ft. W, 100 ft. S, NE cor., Sec. 23-16-6 .....Arranging test 2,450 ft.
Southern Carbon Co.'s No. 1-C Thomason, 1,980 ft. N, 1,400 ft. W, SE cor., Sec. 14-16-6 .....Derrick.
United Carbon Co.'s No. 1 Boughton, 3,244 ft. E, 4,693 ft. N, SW cor., Sec. 1-16-6 .....Cmtd. 12-in. 186 ft; 8-in. 938 ft.
United Carbon Co.'s No. 1 L. Williams, 1,980 ft. S, 1,980 ft. W, NE cor., Sec. 33-16-6 .....Cmtd. 12-in. 176 ft; 8-in. 838 ft.

SABINE PARISH—PLEASANT HILL

Ark. Fuel Oil Co.'s No. 14 Logan, 1,035 ft. N, 241 ft. W, C, Sec. 33-10-12 .....W.O.S.R; 8-ft. sand; T.D. 3,230 ft.
F. A. Bartlett, Jr.'s No. 1 Logan, 200 ft. S, 200 ft. E, NW cor., Sec. 27-10-12 .....S.D. wtr. 1,764 ft.
A. C. Glassell's No. 1 Logan Oil Co., 300 ft. E, C, Sec. 23-10-13 .....S.D. wtr; T.D. 1,710 ft.

SABINE PARISH—ZWOLLE

Ark. Fuel Oil Co.'s No. 1 Susie Russell, 330 ft. N, 330 ft. E, SW cor. E½ NW NE, Sec. 26-8-12 .....Coring 2,372 ft.
Tom Davis' (was T. D. Allison's) No. 1 Holliday, Sec. 31-8-12, Zwolle Townsite .....S.D. wtr. 1,350 ft.
F. M. Hood's No. 1-B Winston (was No. 2), 700 ft. E, 425 ft. S, NW cor., Sec. 31-8-12, Zwolle Townsite....S.D. 1,065 ft.
Dixie Oil Co.'s No. 1 Parrott, 330 ft. N, 330 ft. E, SW cor. SE NE, Sec. 26-8-12 .....Location.
Dixie Oil Co.'s No. 1 Tatum, 330 ft. N, 330 ft. E, C, Sec. 26-8-12 .....Location.
Huber & Mann's No. 1 Newton, 330 ft. S, 330 ft. E, NW cor. NE SW, Sec. 25-8-12 .....W.O.S.R; full oil; T.D. 2,417 ft.
Ab Jones et al's No. 1 Ferguson, 330 ft. N, 330 ft. W, SE cor. NE SW, Sec. 33-8-12 .....Rig up.
Lacey Burkett Co.'s No. 1 Danna, 316 ft. E, 200 ft. S, C, Sec. 26-8-12 .....Cmtd. 6¾-in. 2,194 ft; T.D. 2,344 ft.
Lanier & Tarver's No. 1 Newton, 530 ft. S, 530 ft. E, NW cor. NW SW, Sec. 25-8-12 .....S.D.; fuel 1,932 ft.

Notice how this filling station, equipped with Pyle-O-Lyte floodlights, stands out. Such lighting gets the business.

You'll find the answer at Booths 65-66 Texas Building International Petroleum Exposition

IF you're interested in floodlighting that makes filling stations attract customers like arc lights attract moths . . . in turbo-generators that are the "last word" in refinery and rig lighting . . . in vaporproof fittings to meet the severest oil field requirements . . . you'll find the answer at the Pyle-National Booths 65-66, Texas Building, at the Tulsa Exposition.

The accompanying illustrations show some characteristic jobs. If you are unable to attend the Exposition, or want details for your files, write for Pyle-National bulletins.

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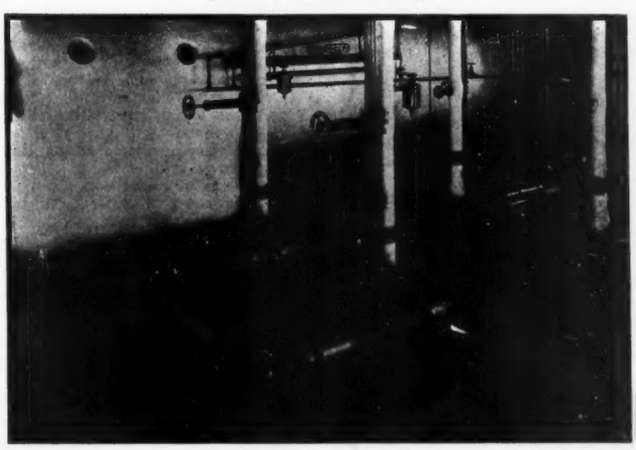
ABOVE: Pyle-National vaporproof fitting.

BELOW: Pyle-National Turbo-generators in a natural gasoline plant at Oklahoma City.



OGJ 10-2 Gray

OKLAHOMA PIPE LINE COMPANY

TRANSPORTERS OF CRUDE PETROLEUM

MUSKOGEE, OKLAHOMA

Loring Oil Co.'s No. 12 Bowman-Hicks, 330 ft. S, 345 ft. W, NE cor. SE NE, Sec. 33-8-12 ..... Top chalk 2,405 ft; cmtd. 6⅝-in. 2,330 ft; small S.O; bailed dry; 2,556 ft; arranging to shoot; T. D. 2,585 ft.

Loring Oil Co.'s No. 2 Sabine Lbr. Co., 1,430 ft. E, 340 ft. N, C, Sec. 34-8-12 ..... 100 ft. oil in hole; W.O.S.R; T.D. 2,600 ft.

Loring Oil Co.'s No. 2 Schull, 957 ft. E, 330 ft. S, NW cor. SW, Sec. 26-8-12 ..... Bailed dry 2,391 ft; dry 2,640 ft. T.A. 2,643 ft.

Lyon et al's No. 1 Williams, 330 ft. N, 330 ft. W, SE cor SW SE, Sec. 32-8-11 ..... Rig up.

W. D. Perritt et al's No. 1 Elliott, 150 ft. N, 150 ft. E, SW cor. SW SE SW, Sec. 30-8-12 ..... W.O.S.R; 1,300 ft. oil; T.D. 2,356 ft.

Posey et al's No. 1 Peterson, Blk. 16, Zwolle Townsite, Sec. 31-8-12 ..... S.D. 250 ft.

Pugh-Hickman Drlg. Co.'s No. 1 Sabine Lbr. Co., 350 ft. N, 350 ft. E, SW cor. NW NE, Sec. 34-8-12..... Derrick.

A. H. Tarver et al's No. 2 Sabine State Bank, 300 ft. N, 300 ft. E, SW cor. NW, Sec. 26-8-12 ..... Comp. June 1; prod. 45 bbls. 2,327 ft; O.W.D.D; drlg. Aug. 25, 2,370 ft; W.O.S.R; 2,400 ft.

Wheatcroft et al's No. 1 Sabine Lbr. Co., SW NE, Sec. 31-8-12 ..... S.D. 2,495 ft.

SABINE PARISH—BLUE LAKE

R. L. Gay's No. 8 Bowman-Hicks, Sec. 18-7-13..... Bailed dry 2,552 ft; plugging to 2,492 ft.

R. L. Gay, trustee's No. 5 Sabine Lbr. Co., 330 ft. S, 330 ft. W, NE cor. SE NE, Sec. 15-7-14 ..... Bailing; no show; T.D. 2,560 ft.

UNION PARISH

Bahan & Bahan's No. 1 Tanner, 591 ft. E, 46 ft. S, NW cor., Sec. 29-22-4 ..... Cmtd. 8-in. 875 ft; drlg. 1,600 ft.

Industrial Gas Co.'s No. 5 Grayling Lbr. Co., 660 ft. E, 660 ft. S, NW cor. NE, Sec. 28-21-4 ..... Derrick.

Industrial Gas Co.'s No. 6 Grayling Lbr. Co., 660 ft. E, 665 ft. N, SW cor. NW, Sec. 33-21-4 ..... Arranging test; T.D. 2,113 ft.

Interstate Nat. Gas Co.'s No. 1 J. M. Edwards, 1,980 ft. W, 660 ft. S, NE cor., Sec. 11-21-3 ..... Cmtd. 8-in. 858 ft.

WEBSTER PARISH—SAREPTA AND SHONGALOO

H. M. Jones Drlg. Co.'s No. 2 Cooke, (was E. W. Bateman's), 200 ft. S, 200 ft. W, NE cor. SE NW, Sec. 2-22-11 ..... 14-ft. sand; W.O.S.R; 2,727 ft.

H. M. Jones Drlg. Co.'s No. 1 Womble, 860 ft. S, 200 ft. E, NW cor. SW, Sec. 1-22-11 ..... Derrick.

Liggett et al's No. 2 Slack, 720 ft. E, 150 ft. N, SW cor. SE SE, Sec. 36-23-11 ..... S.D. 2,618 ft.

Magnolia Pet. Co.'s No. 2 Gardner, 100 ft. S, 145 ft. W, NE cor. SE NW, Sec. 1-22-11 ..... Cmtd. 8⅛-in. 2,726 ft; T.D. 2,738 ft.

Sarepta Oil Co.'s No. 3 Gardner, 396 ft. N, 78 ft. E, SW cor. NW NW, Sec. 6-22-10 ..... Derrick.

Sarepta Oil Co.'s No. 2 Gardner, NE SW, Sec. 1-22-11....Rig up.

Sarepta Oil Co.'s No. 1 Slack, SW cor. NW NE, Sec. 36-23-11 ..... Rig up.

ARKANSAS

JOHNSON COUNTY

Ark.-La. P. L. Co.'s No. 1 Hudson et al, 660 ft. N, 545 ft. E, SW cor. SE NE, Sec. 14-10-24 ..... Rig up.

Ark.-La. P. L. Co.'s No. 1 Mattie Kelly, 330 ft. S, 657 ft. E, NW cor. SW SW, Sec. 14-10-24 ..... Drlg. 1,078 ft.

Conn Grable's No. 1 Hoeing, 720 ft. N, 590 ft. W, SE cor., Sec. 20-9-25 ..... Drlg. hard sand 2,236 ft.

OUACHITA COUNTY—SMACKOVER

L. H. Hamilton's No. 3 Doyle, 100 ft. E, 400 ft. N, SW cor. SE SE, Sec. 23-15-16 ..... Derrick.

W. J. Thomas' No. 1 Usserey & Arnold, 200 ft. N, 200 ft. W, SE cor. NW, Sec. 36-15-15 ..... Derrick.

UNION COUNTY—CHAMPAGNOLLE

Ohio Oil Co.'s No. 10 Crain, 330 ft. S, 330 ft. W, NE cor. SE SW, Sec. 1-17-14 ..... Derrick.

Ohio Oil Co's No. 4 R. Pumphrey, 330 ft. S, 330 ft. W, NE cor. NE NW, Sec. 12-17-14 ..... Rig up.

UNION COUNTY—EL DORADO

Malloy & Co.'s No. 7 Burns, SW cor. NW NW, Sec. 31-17-15 ..... Began drlg. Sept. 20; cmtd. 12-in. 136 ft.

Rice Drlg. Co.'s No. 1 Watley, 150 ft. S, 150 ft. E, NW cor. SW, Sec. 7-17-15 ..... Reported abd. 92 ft. Apr. 30, 1930 arranging to resume drlg.

UNION COUNTY—SMACKOVER

J. E. Crosbie, Inc.'s No. 1 G. L. Murphy, 300 ft. N, 300 ft. W, SE cor. SW NW, Sec. 13-16-16 ..... Began drlg. Sept. 16; cmtd. 12½ in. 203 ft; drlg. 1,325 ft.

EAST TEXAS

HARRISON COUNTY

Calatex O. & G. Co.'s No. 6 Agurs, 755 ft. N, 699 ft. W, Mile Post 27, in J. Womack Sur. ..... Location.

Shell Rock Pet. Co.'s No. 1 Oliver Dougherty, W. D. Burris Sur. ..... S.D; brown chalk 3,520 ft.

PANOLA COUNTY

Ark.-La. P. L. Co.'s No. 2-A G. W Brumble, 477 ft. W, 473 ft. S, NW cor., Jno. Womack Sur., in B. C. Jordan Sur. ..... Drlg. 2,342 ft; second hole.

S. E. Bell et al's No. 1 Burnett Lbr. Co., C. S. B. Hendricks Sur. ..... Cmtd. 8⅝-in. 2,047 ft.

Crichton & Hart's No. 1 Greeny-Kyle, (was W. G. Banks et al's), C Greeny-Kyle 60 ac., Jas. Tippett Sur. ..... Rig up.

Knox et al's No. 1 Dunham (was Jackson et al's), 150 ft. W, 150 ft. N, SE cor., M. I. Dunham 29 ac., in Chas. Haley Sur. ..... S.D; W.O. 2,400 ft.

Nat. Gas Products Co.'s No. 3 Tom Moore, 889 ft. E. 7,928 ft. S, NW cor., B. C. Jordan Sur. ..... Bailing 4,666 ft.

Tex-La. Prod. Co.'s No. 1 O. M. Lawrence, Harrison Davis Sur. ..... Drlg. lime 2,128 ft.

Doris Thomason's No. 15 Crenshaw, 1,992 ft. S, 2,305 ft. E, SW cor., Jno. Womack Sur., in B. C. Jordan Sur...Derrick.

SUMMARY OF STATEMENTS MADE SEPTEMBER 10 OF VARIOUS PIPE LINES FOR MONTH ENDING AUGUST 31

	Gross stocks	Runs from wells	Other receipts	Regular deliveries	Other deliveries
Nat. Transit	808,225.58	118,378.49	821,033.51	479,192.75	469,150.64
S. W. Pa. P. L.	490,266.60	70,719.58	581,346.53	280,390.24	356,035.85
Eureka P. L.	1,603,479.15	272,439.56	308,794.97	273,684.53	390,002.60
Buckeye P. L. (Macksburg)	694,516.87	320,091.51	12,391.70	160,065.90	216,657.32
Buckeye P. L. (Lima, etc.)	5,004,621.10	91,699.80	2,202,086.02	1,394,277.59	895,814.00
Buckeye P. L. (Cleveland)	66,815.01	11,270.77	85,388.09	1,713.66	90,524.57
Indiana P. L.	836,606.05	3,933.81	2,886,525.59	1,335,998.08	1,489,553.89
Cumberland P. L. ..	547,844.28	169,133.16	2,298.20	205,045.71	.....
Southern P. L.	245,676.27	.....	203,801.29	69,211.54	194,278.09
Bradford Trans. ...	197,440.63	314,490.88	.....	381,474.90	.....
N. Y. Transit	144,696.68	25,399.13	164,479.75	172,930.08	25,444.25
Northern P. L.	416,121.94	.....	432,613.22	126,321.25	226,658.06
Tide Water Pipe ..	1,043,300.56	26,087.89	.....	504,721.54	.....
Tuscarora Dev. ...	278,425.17	.....	.....	503,354.86	.....
Total Aug. 31 ..	12,378,035.99	1,424,644.58	7,700,758.87	5,887,382.59	4,354,119.27
Total July 31 ..	12,728,189.93	1,874,547.30	6,029,446.60	5,785,077.82	3,449,652.70
Difference	350,153.94	449,902.72	1,671,312.27	102,304.77	904,466.57

Principles Governing Choice of Tubing

Selection of Length and Diameter. Question of Irregular Flow Discussed. Periodical Flowing Explained

By J. Versluys
Adviser to the Bataafsche Petroleum Maatschappij, The Hague, Netherlands*

A well can flow exclusively through the casing or exclusively through a tubing but can also flow partly through a casing and at the top part through a tubing. The main principles of the flowing of wells under these conditions were explained in the author's former paper.[1] Practically all factors that influence the regular flow are dealt with therein. The question of irregular flow, however, will be discussed briefly here. As a rule, an irregular flow must be avoided, as it may be assumed that the efficiency is thereby very small, while on many fields it is injurious to the sand of the oil-bearing layer.

Periodical flowing often occurs with rising mixtures of gas and liquid. The phenomenon can be explained if it is accepted that two conditions are possible in the mixture; namely, the foam condition and the mist condition.

If there is no stabilizer in the liquid, the foam condition can exist only when the liquid forms a greater portion of the volume than the gas. The mist condition, on the other hand, can exist only when the liquid occupies a smaller part of the volume than the gas. The foam condition occurs when there are gas bubbles in the liquid mass, while in the mist condition drops of liquid are disseminated in a gas-filled space.

For sake of simplicity, it has been assumed that the mist condition prevails when 50 per cent or more of the volume is occupied by gas, while with less than 50 per cent gas the foam condition will arise. For distilled water and for oils which do not tend to form stable foams this is probably approximately true. If this does not hold good, however, two cases are possible: (1) The fields of the two conditions overlap or (2) they do not meet.

Intermediate Field

If the fields of the conditions overlap there is an intermediate field where either of the two conditions can exist, depending on the history of the mixture. Suppose the foam condition prevails first and the gas expands; in this event the foam will break and the liquid will disperse as soon as the ultimate proportion of gas in the mixture has been obtained. Owing to the overlapping of the two fields the mist condition, which has arisen through the breaking of the foam, will persist. If on the contrary the mixture is under the mist condition first, and it is compressed, the conversion to the foam condition will take place only when the gas volume has so far decreased that the limit of mist condition is reached. Due to the overlapping, the new condition will not be disturbed.

If the fields of mist and foam conditions do not meet, however, there is no sudden conversion if the volume ratio of the two substances gradually changes, whatever the history of the mixture may be. If we start with the foam condition and the gas expands when the limit of this condition is reached, the foam will break but there is not yet sufficient gas to allow of the existence of the mist condition throughout the mass. Probably the mixture will dissociate; that is, it will be converted into a mixture of small bodies of foam and of mist. Not until the gas has sufficiently expanded to allow of the mist condition throughout the mass will the foam entirely disappear.

In the former considerations, however, the tendency of the two substances, gas and liquid, to segregate, because of the great difference in their specific gravities, has been disregarded. This would be correct only with a very intimate mixture; that is to say, with very small bubbles of gas or very fine drops of liquid.

The dispersion of gas in liquid (the foam condition) or of liquid in gas (mist condition) generally is not such as to make the particles (either the bubbles or the drops) so small that the bubbles will not rise and the drops will not sink at an appreciable rate. This question of the segregation of the two components, gas and liquid, the effect of which is neutralized by the continuous rising of the mixture in a channel, is of vital importance in considering the flow conditions in a channel. The result is that the gas always has a greater velocity than the liquid. Gas bubbles will endeavor to rise in the heavier liquid under all circumstances, while drops of liquid distributed in a gas will always have a tendency to drop. In the foam condition the difference in velocity is small, while in the mist condition it is large.

Velocity of Drops

It appears from experiments made by J. S. Owens[2] that gas bubbles rise in oil at a rate of about 8 inches per second. In water the average velocity is approximately 12 inches per second. Investigations made by Lenard[3] have demonstrated that the velocity of the fall of drops of water in air can be as follows:

Diameter of drops, millimeters	Maximum velocity of fall, feet per second	Diameter of drops, millimeters	Maximum velocity of fall, feet per second
0.01	0 01	1.5	19.0
0.02	0.04	2.0	19.7
0 03	0.10	2.5	21.3
0.05	0.27	3.0	23 0
0.1	1.0	3.5	24.7
0.2	4.3	4.0	25 9
0 3	9.0	4.5	27.0
0.4	11.0	5.0	27.0
0.5	12 0	5.5	27.0
1.0	16.0	...	....

Rising air should have the following velocities in order to entrain drops of water:

Diameter of drops, millimeters	Velocity of rising air, feet per second
1.28	16 0
3.49	24.6
4.50	27 0
5.47	26.6
6.36	26.0

Figures were found by W. Schmidt[4] which do not differ to any appreciable extent from those found by Lenard.

A result of the difference in velocity is that the proportion in which gas and liquid are mixed when the mixture rises is different from that in which they flow through. The liquid always moves more slowly and each particle of liquid remains longer in a certain part of the traject than does a particle of gas.

This can be conceived as follows: Suppose pedestrains and motor cars are moving along a road in the same direction at such a rate that one pedestrian and one motor car pass a certain point each minute, there will always be 15 pedestrians and 1 motor car in a stretch of 1 mile if the former have a speed of 4 miles and the latter a speed of 60 miles per hour. The ratio of the flow is then 1/1 and the ratio of the mixture is 15/1. Therefore the proportion in which liquid and gas are mixed is always more to the advantage of the liquid (the slowest) than that in which the two substances flow through, and a large difference in velocity with one and the same ratio of flow will change the ratio of the mixtures more to the advantage of the liquid than a small difference in velocity.

Ratio of Mixture

The ratio of mixture depends on both the ratio of flow and the difference in velocity and also on the absolute velocity. This is a point of great importance; the ratio of mixture determines which condition will occur—the foam condition or the mist condition — but each of these conditions has its own difference in velocity, and the difference in velocity has a great influence on the ratio of mixture. As will be seen below, the consequence of this is that with a certain velocity of rise of the mixture and with certain ratios of flow, neither the foam condition nor the mist condition is actually possible.

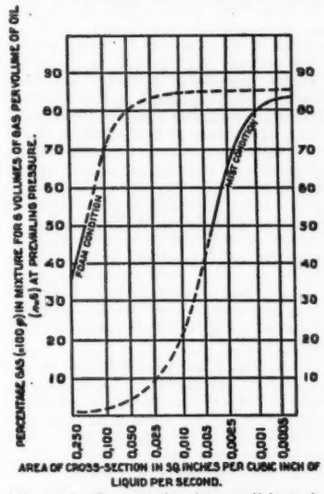


Figure 1—Foam and mist conditions for various percentages of gas in mixture.

If a mixture of gas and liquid rises in a vertical channel the pressure decreases and the gas expands in consequence. As a result of this the ratio of the flow and also the ratio of the mixture change. But the velocity of the mixture also becomes greater. The decrease in pressure has also, therefore, an indirect influence on the ratio of the mixture because the volume of the gas becomes greater when there is a decrease in pressure, so that the velocity increases. This second, indirect influence is not as great as the first.

When the mixture of gas and liquid rises in a channel with a uniform cross section the ratio of the mixture will change more and more to the advantage of the gas. It is quite conceivable, therefore, that at the bottom of such a channel the ratio of the mixture may be such that the foam condition may exist, while at a certain height, in consequence of the decrease in pressure, there would be too much gas present in proportion to the liquid, so that the foam condition would have to give way to a mist condition.

Should this occur, however, a much greater difference in velocity would suddenly arise at the height in question and in consequence of this ratio of the mixture would again change to the advantage of the liquid, so that there would be too much liquid present in the mixture for the mist condition. The mist condition cannot, therefore, arise immediately. This is only possible higher up after the pressure has decreased still more and the ratio of the flow, the absolute velocity and also the ratio of the mixture have changed much more to the advantage of the gas. Therefore there will be a zone where neither the foam condition nor the mist condition is possible. Should the foam condition arise for a moment in this zone, the accompanying small difference in velocity would cause too much gas to be present in the mixture and the mist condition would have to arise. Similarly, if the mist condition then arose for a moment the liquid would again predominate in the mixture in consequence of the large difference in velocity and the foam condition would again arise, which, however, as has been described, would have to give way again to the mist condition. There is a vicious circle here.

Differential

The result will be that part of the gas will rise with as much liquid as it can entrain in the mist condition. The remaining liquid will keep as much gas confined as it is possible for it to contain in the foam condition. At first, therefore, larger foam bodies will be entrained in the mist. These will have a tendency partly to remain behind, that is to say, to rise more slowly, and yet at the same time to give off continually more mist. Differentiation, therefore, takes place and in consequence there is periodical flowing. This differentiation more or less conforms with the differentiation described heretofore, which may be caused without difference of velocity in case the fields of foam and mist conditions do not meet.

The larger bodies of foam entrained by the gas, or the mist, when segregation takes place, will have a greater difference of velocity with the surrounding gas than the small drops in mist condition. In many cases even the difference of velocity would be greater than the velocity of the gas and the larger bodies would not be lifted. In this event they are thrown up from time to time, and this can cause real intermittence.

The question of the intermediate condition between the foam condition and the mist condition, due to difference in velocity, can be summarized as follows. The great difference in velocity existing in the mist condition causes a lower ratio of gas to liquid. In consequence of this, if the ratio of the flow of gas and liquid is not very high, the ratio of mixture will arise at which the foam condition must result. As soon, however, as this arises the difference in velocity becomes small and the ratio of mixture of gas to liquid becomes high again, so that the foam condition becomes at once impossible.

According as the absolute velocity is greater, the influence of the difference in velocity on the ratio of the mixture is smaller. As the difference in velocity always transposes the ratio of the mixture towards that of the foam condition, a great velocity of rise, which itself is promoted by a small cross section, will in general have a tendency to make the ratio of the mixture favorable for the mist condition.

With certain qualities of gas and liquid flowing through per unit of time, two critical cross sections exist, for the foam condition is possible only up to a certain maximum velocity, thus to a certain minimum diameter. The foam condition exists, therefore, only when the cross sections are larger than the larger of the two critical ones, and the mist condition only when the cross section is smaller than the smaller critical one.

It must, however, be borne in mind

(Continued on Page 382)

*Fall meeting, Tulsa, October, 1930. Copyright, 1930, by A.I.M.E., Inc.

[1] J. Versluys: Mathematical Development of Theory of Flowing Oil Wells. A.I.M.E. Tech. Pub. 213 (1929); also Trans. A.I.M.E., Petroleum Development and Technology (1930) 192.

[2] J. S. Owens: Experiments on Air-Lift Pumping. Engineering (1921) 112, 458-461.

[3] P. Lenard; Ueber Regen. Meteorologische Ztsch. (1904) 21, 249-262.

[4] W. Schmidt: Eine unmittelbare Bestimmung der Fallgeschwindigkeit von Regentropfen. Meteorologische Ztsch. (1909) 26, 183-184.

Development of Casing for Deep Wells

With Operators Figuring on Wells 10,000 Feet Deep Many Problems Are Involved in Proper Selection of Material

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The drilling of constantly deeper oil wells has made it imperative that the manufacturer of casing be ever searching for new methods and new materials to meet the increased demands. One phase of this search constitutes the subject matter of the present paper.

Conditions point to the necessity for drilling to greater depths, and it is not at all improbable that much of the future oil production will be from wells around 10,000 feet. It may be of some interest to observe the change that has taken place in the tensile and collapsing stresses over the last 25 years. The pressure at the bottom of a 900-foot hole, equivalent to the pressure caused by an equal column of water, is only 450 pounds per square inch. The equivalent water pressure corresponding to the depth of the deepest hole today would be 4,762 pounds per square inch.

The tensile stresses in the top joint due to the weight of the casing string also has increased enormously during the same period. For example, the unit stress (at the root of the first perfect thread), in the top joint of a string of 5¾-inch 22.5-pound per foot casing is only 4,050 pounds per square inch for the well of 25 years ago. The stress in the top joint of the present deepest hole, assuming the same size casing was used for the inner string, would be 42,360 pounds per square inch.

First wrought iron, and then mild-steel, lapwelded, casing provided sufficient strength for the tensile and collapsing stresses encountered. Between 1920 and 1925, with the advent of 3,000-foot wells, the necessity for a stronger casing became evident. Steel higher in carbon, adapted to manufacture into casing by the seamless process, offered the requisite physical characteristics. Accordingly, seamless steel casing continued to satisfy the requirements until early in 1929. Again, demand arose for a stronger casing, one capable of being set at depths approaching 10,000 feet. This demand necessitated the development of a steel to meet the increased requirements and resulted in the addition of grade D—high tensile casing—to the A.P.I. specifications for the physical properties of seamless casing (Table 1).

TABLE 1—AMERICAN PETROLEUM INSTITUTE SPECIFICATIONS FOR PHYSICAL PROPERTIES OF CASING MATERIAL, MINIMUM REQUIREMENTS

Grade[1]—	Tensile Strength, Lbs. per sq. in.	Yield Point, Lbs. per sq. in.	Elongation in 2 In., Per Cent
A (0.10-0.20 C)	48,000	30,000	40
B (0.30-0.40 C)	70,000	40,000	25
C (0.40-0.50 C)	75,000	45,000	20
D (Alloys of various types)	95,000	55,000	18
E[2] (Alloys of various types)	110,000	60 per cent of Tensile Strength	

[1]The notes in parentheses indicate the type of material that will give the required properties.
[2]Grade E is tentative at present.

Factors Involved in Selecting Casing for Deep Wells

There are two primary objects in casing a well:

1. To prevent water and cavings from entering the hole and interfering with drilling to the proper depth.

2. To provide a permanent wall for the hole drilled, so that any oil or gas found can be controlled.

To satisfactorily attain these objectives three factors of vital importance must be considered in the selection of casing for the modern deep well:

1. The strength of the string of casing joints in tension.

2. The resistance of the string of casing joints to external collapsing pressure.

3. The toughness or resistance of the string to shock.

The strength of casing joints in tension is a function of several variables. Those of prime importance are: (1) the yield point of the casing steel; (2) the diameter and wall thickness of casing; (3) design of the threaded joint. Similarly, resistance to collapse by external pressure is affected by a number of different factors, of which the principal ones are: (1) the yield point of the casing steel; (2) diameter and wall thickness of casing; (3) original departure of casing cross section from a perfect circle (out of roundness).

The benefits to be derived from high-strength casing should be readily apparent. Whenever a string of casing is raised in a well, the top joints must bear not only the weight of the entire string but also the load necessary to overcome friction of the pipe in the hole. In shallow wells the load caused by friction may be negligible, but in deep wells the additional load might be sufficient to cause failure. High tensile casing offers a greater margin of strength to overbalance the frictional load and is therefore particularly valuable for the deeper wells.

The advantages of high-strength casing are equally important in resisting collapsing pressures. The greater danger of collapse exists when the string is placed in tension. The resulting tensile stress in the metal diminishes the collapsing resistance of the casing in almost direct proportion of this stress to the elastic limit of the steel. Consequently, a string of casing that is entirely safe under ordinary conditions may be in imminent danger of collapse when subjected to a severe pull.

Toughness is an essential item in the make-up of satisfactory casing. Considerable shock is received from the movement of the rotary stem in drilling and sometimes there is impact from caving formations. Instances are known where casing has snapped off, even after cementing, and the fracture has had the appearance of a break due to impact stress. Therefore the transverse strength, ductility and toughness must be carefully considered in the selection of casing for deep wells.

The sizes of casing and the design of joints are fairly well standardized at present and may be disregarded in this discussion. Attention will be given only to the steel of which the casing is made, and its importance in determining the resistance of the string to tensile, collapsing and impact stresses.

Selection of Steel for Deep-Well Casing

The large amount of hot work necessary in piercing the rolling casing by the seamless method refines the grain to a great degree. Cooling from the finishing temperature progresses rapidly, on account of the thin section and tubular shape. These two influences tend to make the effects of alloy additions more pronounced than in solid sections.

Two expedients for increasing the physical properties of steel structure are open:

1. Select an analysis that will give the desired strength in the as-rolled condition.

2. Thermally treat the rolled product in a way that will produce the desired strength.

Several requirements and conditions limit the extent to which these methods may be carried. The casing steel (1) evidently must have the quality to withstand piercing and rolling into a seamless tube; (2) must have sufficient ductility and shock resistance in the finished tube to allow straightening; (3) must be of a hardness that will permit cutting off and threading in the regular commercial automatic machines.

The question of the cost of producing a high-strength casing must be considered in view of the large tonnages required in deep wells. An idea of the amount of casing used can be gained from certain California wells. Here, at depths of only 3,600 to 4,000 feet, aproximately 200 tons were needed. Accordingly, a modern deep well of about 8,500 feet requires about 675 tons of casing, representing a correspondingly big item of expense in the cost of the well.

Thermal treatment of casing to improve strength offers a number of possibilities, that is, (1) normalizing; (2) air hardening followed by drawing; (3) liquid quench followed by drawing.

As is well known, certain steels develop improved properties on reheating after rolling followed by cooling in still air. This method is feasibly applied to casing. Tubes can be heated easily in simple furnaces and production maintained without an unreasonably large outlay for equipment. Warpage is a factor that may be controlled by proper design of the cooling bed arrangement. A combination of an air quench with a tempering treatment offers distinct merit as a means of increasing strength for certain classes of steel. The resulting properties are capable of being controlled and maintained with a high degree of uniformity. This process would not be so attractive from the standpoint of obtaining large production with minimum facilities.

A liquid quenching treatment followed by a draw usually develops the maximum properties of a steel. This is definitely proved by the success that has been achieved by heat-treated drill pipe.

Experimental Work

Six different types of steel were selected as being suitable for deep-well casing. A 6-ton heat of each was made in an electric furnace. The electric furnace was used to reduce steel making variables and supply small heats for the tests.

The composition of each of the steels studied is shown in Table 2. The designations appearing in the first column will be followed throughout the course of the paper.

TABLE 2—COMPOSITION OF STEELS STUDIED

Designation—	C %	Mn %	Si %	Cr %	Ni %	Mo %
2½ Mn[1]	0.19	2.65	...	...	...	...
1¾ MnMo	0.27	1.71	...	...	...	0.25
SiMn[2]	0.33	1.17	1.10	...	...	...
SiMnCr[2]	0.31	1.13	0.87	0.42	...	...
1¾ NiMo	0.30	...	...	...	1.73	0.25
CrMo	0.31	...	...	0.58	...	0.22

[1]V. N. Krivobok, B. M. Larsen, W. B. Skinkle and W. C. Masters: Some Characteristics of Low-carbon Manganese Steel. Trans. A.I.M.E. (1927) 75, 404.
[2]A. B. Kinzel: Silicon-Manganese Steels with Chromium Additions for Engineering Applications. Trans. Amer. Soc. Steel Treat. (1928) 14.

Each heat was processed into 6⅝-inch by 24-pound per foot A.P.I. casing (6⅝-in. O.D. by 0.352-in. wall) in the regular manner for making seamless tubes. All of the steels were easily pierced and rolled. The 2½ Mn steel, however, was brittle in the as-rolled condition, as evidenced by the breaking of several lengths in the rotary straightening operation. This steel, also, was very difficult to cut on the automatic cut-off machines used in cropping the ends.

All treating and testing was done under conditions as nearly the same as possible, so that the results should be fairly comparable.

Tensile samples consisted of 1½ by 12-inch longitudinal strips cut from the tube wall. Impact samples were obtained by upsetting the ends of the pipe to a wall thickness that would permit cutting the standard square Izod, V-notch, impact specimen.

Normalized samples were held at temperature for one-half hour, followed by cooling in still air.

Heat-treated samples were held at the quenching temperatures for one-half hour and then immersed in water for 5 minutes. The quenching temperatures used are considered the optimum for each steel and were determined by the experiment or from published data. The temperature of the water was maintained at 125°F. Quenched pieces were tempered immediately for 1½ hours, followed by air cooling. Impact samples of each type of steel were also water-cooled from the 1,100°F. drawing temperature to determine whether any were subject to temper brittleness.

The treated impact samples were tested for cracks by first magnetizing and then dusting with whitened, powdered, highly permeable iron. Cracks not visible to the naked eye were detected by this method.

All test figures are the average of at least two determinations, and for impact values, the results are the average of at least six tests.

Table 3 gives the results of the mechanical properties obtained in testing the six experimental steels in the several conditions. Included in the tabulation are the A.P.I. specifications for grade C and grade D casings.

Metallographic examination of the six steels in the various conditions was made to correlate microstructure with mechanical properties.

Discussion of Experimental Results

It should be understood that the foregoing data are of value for comparative purposes only. However, the results reported for the steels in the as-rolled condition are indicative of regular mill practice.

As-rolled Condition

An examination of the physical properties of the six steels in the as-rolled condition reveals several interesting facts. The yield point and ultimate strength of each is well able to meet the grade D, A.P.I. specification. However, this is at the expense of ductility and machine ability in the two alloys 2½ Mn and 1¾ MnMo. No figures are presented on the notched-bar impact value of the steels in the as-rolled condition, but there is reason to believe that 2½ Mn and 1¾ MnMo are rather poor in this respect. As mentioned, several pieces of the 2½ Mn casing broke in being straightened on the rotary straightening machine. The pseudomartensitic appearance of the microstructure of the 2½ and 1¾ MnMo steels in the as-rolled condition is also an indication of a brittle tendency. It was impossible to thread 2½ Mn casing (as rolled) with the regular automatic machines. The 1¾ MnMo casing threaded with difficulty.

The 1¾ NiMo and the CrMo steels are handicapped at the start by their high cost. Nickel and molybednum are among the more expensive alloys that are added to steel. These two types of steel revealed a desirable combination of strength, ductility, toughness and machinability.

The SiMn and SiMnCr alloys gave casing with good yield point and ultimate strength; the yield point of the SiMnCr steel was markedly high. The ductility

*Before Petroleum Division, A.I.M.E., Tulsa, October 2, 1930. Copyright, 1930, by A.I.M.E., Inc.

and hardness remained at a very satisfactory point in these two steels.

From the data obtained it seemed as though a steel of the SiMn or SiMnCr type, as rolled, would offer one solution to the problem of providing suitable casing for the deeper wells.

Normalized Condition

The properties on normalizing are considerably changed from those as rolled. The 2½ Mn and 1¾ MnMo steels exhibited an appreciable tendency towards air hardening. The remainder showed some small degree of softening. The best results that were secured by normalizing were found in the SiMn, SiMnCr, and 1¾ MnMo types. The elastic ratio (ratio of yield point to ultimate strength) and ductility was considerably improved while still maintaining satisfactory hardness and good impact value.

The susceptibility of the 2½ Mn steel to air hardening is well illustrated by the test figures in Table 3. The impact value of this steel after normalizing was very low, indicating marked brittleness. The 1¾MnMo steel gave high tensile properties with only fair ductility. Also, the shock resistance was of a much lower order than that of the other alloys (excepting 2½ Mn).

It is realized that comparison on the basis of yield point is not exactly fair in the case of the 1¾ MnMo alloy. This steel should have been tempered after normalizing to obtain a yield point of 75,000 pounds per square inch; then the other properties would be strictly comparable. However, it is believed that the relative nature of the conclusions drawn would not be affected even had tempering been done.

Heat-treated Condition

As would be expected, quenching and tempering of the six steels resulted in vastly increased mechanical properties. The test figures give an idea of the maximum properties that can be developed in each type of steel after simple heat treatment under the given conditions.

A critical examination of the properties developed by quenching and then tempering at 1,100°F. shows that the tensile properties of the six steels are practically the same, and the Brinell hardness does not vary widely. In the matter of shock resistance, as determined by the Izod notched-bar impact test, larger differences are noted. The 2½ Mn steel gave low impact values, which would be decidedly dangerous in deep well casing. The values for the other steels were good and indicated satisfactory toughness.

The experiment performed to determine whether the steels were subject to temper brittleness was too incomplete for general conclusions to be drawn. The results seemed to indicate that the 2½ Mn alloy was liable to the phenomenon. No discussion of this much debated question will be attempted here.

The liability of a steel to warp and crack in quenching determines to a large degree the suitability of that steel for a heat-treated structure, such as seamless tubing. The results of the magnetic inspection of the heat-treated samples showed that two steels, 2½ Mn and 1¾ MnMo, were not exempt from cracking caused by quenching. This behavior precludes their employment in heat-treated casing where freedom from leaks is essential. Warpage in heat-treating casing would be difficult to learn by experiments on small test pieces, therefore full sections were completed and quenched and the warpage qualitatively observed. Results were closely in line with those predicted by dilatometer measurements on various similar steels at the Union Carbon and Carbide Research Laboratories, in which SiMnCr steels were the most favorable in this respect.

Commercial Development

At this point, the problem was to select a relatively cheap steel suitable for deep well casing and, if possible, also suitable for use in other seamless tubular goods, probably in a treated condition. Based on the data obtained, it is evident that a steel of the SiMnCr type offers the most logical solution of the steels tested.

Many open-hearth heats of different analyses (SiMnCr type) were rolled into commercial casing to study their behavior in the mill. This study showed that a steel with relatively high alloy content (similar to the small heat described in the preliminary experimental work) was capable of meeting grade E requirements. Furthermore, a steel with a lower alloy content sufficed for grade D specifications.

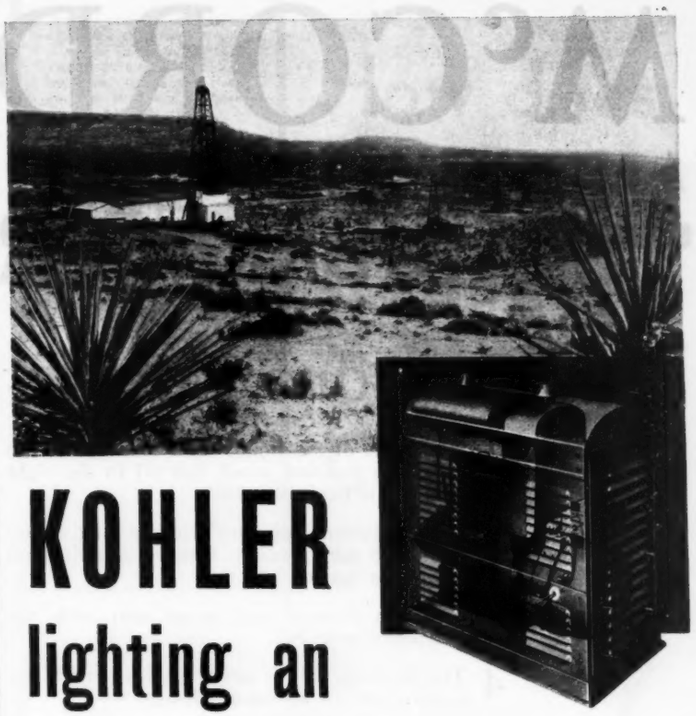
In both grade D and grade E analyses the SiMnCr steels showed excellent working properties and marked freedom from steel-making difficulties. Accordingly, grade D casing is made from the following analysis, modified somewhat for various diameters and wall thicknesses: C, 0.40 per cent; Mn, 1.10; Si, 0.25; P and S, 0.40 max.; Cr, 0.18. Seamless couplings of the same material are regularly furnished on grade D casing.

A large amount of testing has been done on the commercial sizes of this casing to insure its having the requisite properties. Two strip tensile tests have

TABLE 3—PHYSICAL PROPERTIES OF EXPERIMENTAL STEELS

Type Steel—	Heat Treatment, Deg. F.	Yield Point, Lb. per Sq. In.	Ultimate Strength Lb. per Sq. In.	Elongation in 2 In., %	Reduction in Area %	Brinell Hardness 3000 Kg.	Izod V-notch Ft.-lb. Air	Izod V-notch Ft.-lb. Water
Grade C, minimum	.....	45,000	75,000	20	....	.....	....	....
Grade D, "	.....	55,000	95,000	18	....	.....	....	....
2½ Mn								
As rolled	.....	(*)	134,200	13.6	25.4	269-293	....	....
Normalized ...	1,700	(*)	148,500	14.0	20.6	293-302	5.5	....
Heat treated ..	1,700- 900	129,400	144,500	17.9	42.2	302-311	....	....
	1,700-1,000	125,000	134,400	19.5	38.9	286-286	†5	....
	1,700-1,100	112,500	124,500	21.6	45.2	269-272	†9.3	†24.3
	1,700-1,200	96,200	107,600	26.6	49.2	235-241	†73	....
1¾ MnMo								
As rolled	.....	78,000	120,100	18.9	37.2	255-255	....	....
Normalized ...	1,600	88,000	127,100	20.5	32.5	262-269	27.5	....
Heat treated ..	1,550- 900	142,400	160,500	16.4	39.0	332-340	....	....
	1,550-1,000	132,100	149,200	18.0	38.4	311-321	47	....
	1,550-1,100	119,300	136,000	20.5	42.8	286-293	52.5	†55.3
	1,550-1,200	106,300	118,800	24.6	47.8	248-255	†62.5	....
SiMn								
As rolled	.....	60,100	111,600	25.4	42.1	217-217	....	....
Normalized ...	1,650	76,200	109,400	29.6	54.1	212-217	45.5	....
Heat treated ..	1,650- 900	131,700	153,300	17.7	35.8	293-311	....	....
	1,650-1,000	131,400	143,700	19.3	40.0	293-302	42	....
	1,650-1,100	113,500	128,200	22.2	44.9	269-269	48.7	51.3
	1,650-1,200	101,700	113,800	25.8	47.8	241-255	66	....
SiMnCr								
As rolled	.....	72,300	117,400	22.7	43.0	228-241	....	....
Normalized ...	1,650	75,600	110,500	29.5	49.3	217-217	49.7	....
Heat treated ..	1,650- 900	142,700	161,000	16.7	37.1	332-340	....	....
	1,650-1,000	138,300	148,400	19.3	40.4	302-311	41	....
	1,650-1,100	120,000	134,000	21.1	46.1	277-286	54.5	52.6
	1,650-1,200	106,900	122,300	24.6	47.2	255-255	71	....
1¾ NiMo								
As rolled	.....	78,100	103,900	23.5	41.1	214-223	....	....
Normalized ...	1,650	75,800	101,800	23.9	49.1	217-223	56.3	....
Heat treated ..	1,550- 900	143,700	158,700	16.5	33.5	321-332	....	....
	1,550-1,000	134,100	143,100	18.7	44.1	302-302	51	....
	1,550-1,100	115,800	127,600	20.9	47.1	269-277	62.3	56.3
	1,550-1,200	103,400	112,500	26.9	50.6	235-241	69.8	....
CrMo								
As rolled	.....	72,700	102,200	22.0	44.4	207-228	....	....
Normalized ...	1,650	66,000	95,700	28.6	45.6	196-207	49.1	....
Heat treated ..	1,600- 900	150,900	163,500	15.6	38.1	302-351	....	....
	1,600-1,000	134,900	149,800	19.5	44.1	311-321	47	....
	1,600-1,100	119,400	129,200	21.2	47.7	262-267	53.7	54.6
	1,600-1,200	102,400	114,800	23.8	49.9	241-248	74.3	....

*No definite yield point observed; yield point close to ultimate strength.
†These samples were cracked after heat treatment.



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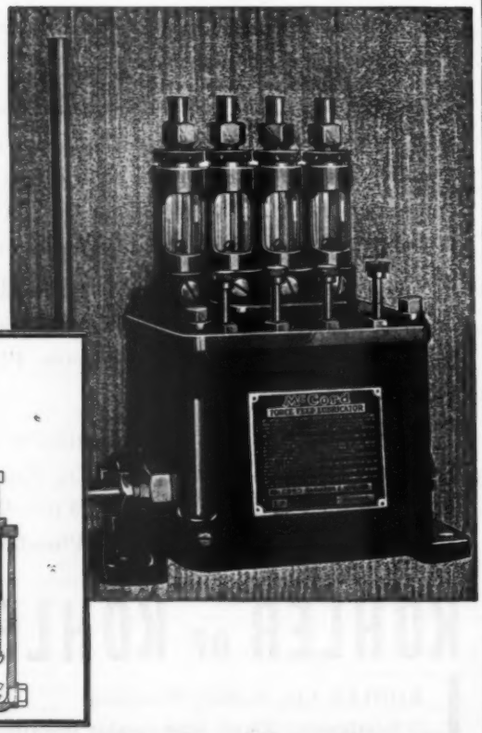
6 It can be regulated, while operating, to give "just enough" oil—from a fraction of a drop to a constant stream.

7 It is quickly filled and effectively cleaned—with large filler opening and strainer.

The numbers in the drawing below are keyed to the seven paragraphs above. This is the last of a series explaining the individual characteristics of the McCord "LF" Lubricator.



McCORD

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LUBRICATOR DIVISION

been made on every heat rolled. Table 4 gives the results of a number of such tests compared with figures obtained on the less strong (0.40 to 0.50 per cent carbon) grade C material. The data have been obtained on a range of sizes from 5-inch by 15 pounds per foot to 13⅜-inch by 68-pound per foot casing.

A detailed study of the strength of full-sized casing joints is now in progress. This work includes a study of the various factors in joint design which influence strength, and will be made the subject of a future paper. A brief comparison of the tensile strengths of grade C and grade D casing joints is available from the data so far obtained (Table 5).

The data in Table 5 indicate that the strength of the joint has not only been raised by the use of SnMnCr steel, but that it has been increased in a greater ratio than the increase in ultimate strength. In other words, a higher joint efficiency has been obtained by using SiMnCr steel.

There is no standard transverse test applicable to pipe samples. Accordingly, simple shop methods were devised to test the characteristics of the grade D casing in a transverse direction. Rings, approximately 2 inches wide, were cut from the ends of a number of pieces of grade D casing, for which the physical properties were known. Each ring was flattened in a press until rupture just started. At this instant, crushing was stopped and the height of the flattened ring was measured. This information indicated that the height after crushing represented six to eight times the wall thickness of the casing. As a result, it was decided that a ring possessed satisfactory transverse ductility and toughness if it could be crushed to a height of 10 times the wall thickness without rupture, and therefore this method is used as a routine part of the inspection of grade D casing. The crop ends from every tube are flattened in a large press to a distance of 10 times the wall thickness of the casing.

Tubes that fail in the flattening test are normalized and retested. The percentage of tubes requiring normalizing is very small, only a fraction of 1 per cent. Occasionally a tube is finished at a lower temperature by the seamless mill. Any cold work received accounts for the failure to pass the test. Normalizing has always restored the ductility, enabling a ring to pass the flattening test satisfactorily.

Some of the depths to which SiMnCr type of casing has been set are given in Table 6.

TABLE 6—DEPTHS TO WHICH SiMnCr CASING HAS BEEN SET

Outside diam.—	Lbs. per foot	Depth, feet
Regan County, Texas		
6⅝	28	8,000
5½	20	7,950
5	18	7,806
California and Oklahoma		
11¾	60	4,800
10¾	45	6,480
9⅝	40	5,914
9	45	6,459
8⅝	36	7,500

Anticipating future demand, work has been done on the development of casing to meet grade E requirements.

Several experimental heats rolled into 6⅝-inch and 9⅝-inch casing have developed the required tensile properties. The following analysis has proved satisfactory for the grade E specification, being slightly modified for different sizes and weights: C,0.40 per cent; Mn, 1.10; Si, 0.85; P and S, 0.040 max.; Cr, 0.50.

A brief summary of physical test results is given in Table 7.

These figures are not to be construed as indicative of practice to be followed in the future.

That SiMnCr type grade D casing is fulfilling a definite need is apparent from the fact that over 2,000,000 feet have been shipped.

Acknowledgment

The author wishes to express his appreciation for the kind interest shown by C. R. Barton, vice president, Spang, Chalfant & Co., Inc. He is also especially indebted to A. V. deForest, consulting metallurgist, for the great amount of help and encouragement given in the preparation of this paper. The author thanks A. G. Sturrock for assistance in the metallographic work, and F. H. Bremmer for help in obtaining physical test data.

TABLE 4—COMPARISON OF PHYSICAL PROPERTIES OF GRADE C AND GRADE D CASINGS

A.P.I. Grade	Number of Tests	Yield Point, Lb. per sq. in.	Ultimate Strength Lb. per sq. in.	Elongation in 2 In., Per Cent	Reduction in Area, Per Cent
C	Avg. 340	52,000	98,000	25	39.5
	Range	47-58,000	89-105,000	20-30	32-47
D	Avg. 200	64,750	107,500	25	43
	Range	58-69,000	98-112,000	18-28	35-50

TABLE 5—COMPARISON OF TENSILE STRENGTH OF GRADE C AND GRADE D CASINGS TESTED IN FULL SECTION

A.P.I. Grade	Type Steel	Size Tested*	Wall Thickness	Ultimate Strength at Failure—Joint-lb.	Ultimate Strength at Failure—Pipe at Gage Point, Lb. per Sq. In.	Ultimate Strength Strip, Lb. per Sq. In.
C	0.40-0.50 C	6⅝-in. 24 lbs. per ft.	0.343	409,000	80,000	95,250
C	0.40-0.50 C		0.343	411,000	80,200	95,900
C	0.40-0.50 C		0.344	410,000	79,600	94,650
D	SiMnCr		0.324	495,000	103,700	107,500
D	SiMnCr		.0327	568,000	117,800	106,000
D	SiMnCr		0.335	491,000	98,800	106,850

*10 thread, ¾-in. taper, 3-in. total lengt h of thread.

TABLE 7—PHYSICAL PROPERTIES, GRADE E CASING

	As Rolled	Normalized
Yield point, lb. per square inch	68-80,000	70-80,000
Ultimate strength, lb. per square inch	118-138,000	115-130,000
Elongation in 2 in., per cent	17-24	18-25
Reduction in area, per cent	30-40	35-40
Brinell hardness	269-285	248-277

PRINCIPLES GOVERNING THE CHOICE OF TUBING

(Continued from Page 377)

that the mist condition is not possible with every ratio of flow. This condition is not tenable when more liquid flows through than gas. The difference in velocity can never make the ratio of mixture more favorable to the gas than the ratio of flow. The foam condition can take place theoretically with every ratio of flow if the cross section is large enough. An extreme case would be when the quantity of liquid rising is 0.

Intermittency in Flow

Every pipe in which a mixture of gas and liquid rises will show a certain intermittency in flow when in one part the cross section lies between the two critical ones for the ratio of flow prevailing there (which, as said, depends primarily on the pressure).

Mathematically the principle can be deduced simply as follows:

As has already been said, no matter which prevails, the foam condition or the mist condition, there is a difference in velocity between gas and liquid, which will be represented by b.

If the velocity of the gas is u, that of the liquid is u—b. If per unit of volume of liquid at the prevailing pressure, n volume units of gas flow through at a pressure prevailing in a certain cross section, then in that cross section, for

each unit of volume flowing through per unit of time, a surface of:

$$\frac{1}{u-b} \text{ is occupied by liquid} \quad (1)$$

and

$$\frac{n}{u} \text{ by gas} \quad (2)$$

If the cross section per unit of volume liquid flowing through per unit of time is S, then

$$S = \frac{n}{u} + \frac{1}{u-b} \quad (3)$$

It follows from equations 1 and 2 that although gas and liquid flow through in the ratio n, they are mixed in the cross section in the ratio.

$$\phi = \frac{n}{u} : \frac{1}{u-b} = \frac{n(u-b)}{u} \quad (4)$$

As always

$$\frac{u-b}{u} < 1$$

consequently

$$\phi < n \quad (5)$$

That is, the ratio of the mixture is higher than the ratio of the flow.

If then, the velocity is taken from equations 3 and 5, S may be expressed as follows:

$$S = \frac{(N-\phi)\ (\phi+1)}{\phi b} \quad (6)$$

It is known from observation that in the foam condition b = 8 to 12 inches and in the mist condition 250 to 300 inches per second.

In order to be on the safe side (that is, not to take the limits of the intermittency too narrow) it is taken here that:

for the foam condition
b = 8 in. per sec. (7a)

for the mist condition
b = 400 in. per sec. (7b)

No Stabilizer Present

If the foam condition exists and the volume of the bubbles increases in proportion to that of the liquid, it may be assumed that if there is no stabilizer present (in water this may be soap, for instance) the bubbles will touch one another and flow together when the gas volume is as large approximately as the liquid volume. This means that the liquid disperses in drops.

In the same way, when the mist condition exists, the drops will touch one another and have a tendency to unite when their total volume becomes as large as that of the gas. A continuous liquid mass then forms which contains gas bubbles. Although it is not quite correct to do so, for the sake of simplicity it will be taken that $\phi = 1$ is the limit of the possibility of the existence of either the mist condition or the foam condition.

If $\phi > 1$, the mist condition prevails, while if $\phi < 1$, the foam condition prevails. This applies to water and to many grades of oil. It may be thought that ϕ may be greater for some kinds of oil. Provisionally, however, ϕ is taken as equalling 1.

Further, the fact that the difference b becomes smaller both in the foam condition and in the mist condition if the volumes of gas and liquid in the mixture become approximately equally large will be left out of consideration.

Diameter of Tubing

The value in equation 7a is probably approximately exact, the value in 7b is too great. By assuming the latter value, which is exaggerated, the limits of the range of diameter of a tubing to be avoided, on account of the irregular flow that would be caused, if calculated according to the deductions will spread farther than they really do. So we are safe in assuming the values of 7a and 7b.

As an example, in Figure 1 there are plotted in semilogarithmic co-ordinates the percentages of gas in the mixture against the values of S for n = 6. In this diagram the values of S are expressed in square inches per cubic inch of liquid flowing through per second (when we come to practical applications, we will substitute barrels per day). The values of S have been computed by the aid of equation 6, in which have been substituted the values of ϕ corresponding to the different percentages of gas in the mixture. On account of the existence of two values of b (see equations 7a and 7b), two lines can be traced.

If we assume that foam condition in a mixture is able to exist as long as less than 50 per cent gas is present, and that with more gas the mist condition would arise, which is probably not strictly the case, then only the traced parts of the two lines would be available, the broken parts not corresponding to real conditions. Then, although generally speaking with 50 per cent gas in the mixture there would be a transition from foam into mist, in the particular case of the mixture rising in a tubing no direct transition from foam to mist can be established by gradually decreasing the section.

Range of Values

Within the range of values of S between the limits 0.2 and 0.04 none of the conditions will exist. These figures, read from Figure 1, are available only if n = 6, but for any arbitrary value of n, a similar diagram can be drawn and a range of values of S will be found which do not allow the mixture to rise either under foam or under mist condition. Within the range of these values of S the mixture is not able to flow regularly. As in a mixture the mist condition probably arises only if the gas content is more than 50 per cent, and foam condition is limited by a little less than 50 per cent gas, the limits will be farther apart than would appear from the diagram. Inaccuracies on account of this, however, are more than counterbalanced by the too great value chosen for b (equations 7b).

By taking $\phi = 1$ in equation 6, the value of S is obtained for the transition state from foam to mist:

$$S_1 = 2\frac{n-1}{b} \quad (9)$$

When the transition state is reached from the foam condition b = 8 and

$$S_{1f} = \frac{n-1}{4} \quad (10)$$

and when reached from the mist condition, b = 400 and

$$S_{1m} = \frac{n-1}{200} \quad (11)$$

As already concluded by reasoning, there are, therefore, two critical cross-sections, which are expressed per unit of volume of liquid for a certain ratio of flow n by equations 10 and 11. It follows that:

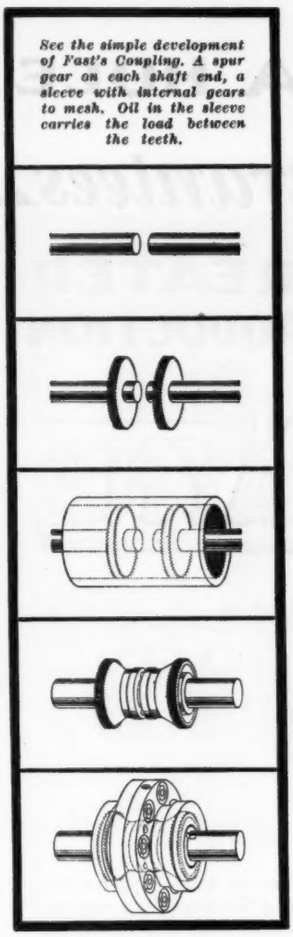
$$S_{1f} = 50 S_{1m} \quad (12)$$

In order to make the mist condition at once possible, when rising takes place, where the foam condition is no longer possible, the cross-section of a pipe would have to be 50 times as small and the diameter $\sqrt{50}$, or about seven times as small.

In Figure 2 the lines representing equations 12 and 13 are traced, the limits S_{1f} and S_{1m} being computed in square inches per barrel of liquid per day. In this diagram logarithmic co-ordinates are used; had the values of S_1 and n been plotted directly, straight lines would have been obtained. This diagram shows that only large quantities of gas or narrow tubes are favorable to the existence of mist condition.

Gas-Oil Ratio

In oil wells generally the tubing or the oil string through which the well produces has a uniform cross section from the bottom to the surface, though there may be one or two sudden enlargements, so that the magnitude S in the above formulas remains constant for a certain length. But as the mixture rises the pressure decreases and accordingly the volume of gas (n in the formulas) increases. The value of n in the formulas



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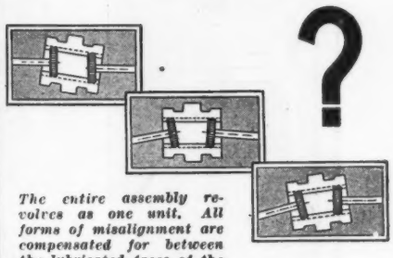

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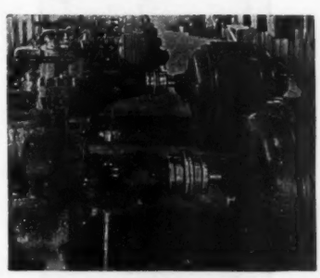

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is the gas-oil ratio at the prevailing pressure. Hence it is the gas-oil ratio at atmospheric pressure divided by the prevailing pressure for every cross-section, if the solubility of the gas in the oil is neglected. This, however, may not be done with small gas-oil ratios. If the gas-oil ratio at atmospheric pressure be denoted by N, then in neglecting the solubility we would write:

$$n = \frac{N}{p} \qquad (13)$$

if p denotes the prevailing pressure for the cross section of the flowing pipe under consideration in atmospheres.

If we take the solubility into regard, we must write:

$$n = \frac{N}{p} - a \qquad (14)$$

if a is the absorption coefficient, which approximately equals 2.5 cubic feet per barrel.

If p is expressed in pounds per square inch, equation 14 should be written as follows:

$$n = 14.7\frac{N}{p} - a \qquad (14a)$$

For each production and each ratio of gas and oil at the prevailing pressure, the diameter of the pipe must be narrower than the smallest diameter indicated in the nomogram or wider than the largest of the diameters so indicated. If the diameter of the pipe lies between these critical diameters, the well flows irregularly.

The gas-oil ratio referred to in Figure 3 varies with the pressure and this ratio for each cross-section of the well is known only if the pressure there is known. It will first be assumed that this is known everywhere. Care must be taken that the well flows at any height through a pipe, either the casing or the tubing, of which the diameter lies outside the two critical ones. If the casing is wider than the larger critical diameter for the gas-oil ratio at the pressure prevailing at the bottom of the well, the tubing need not reach to the oil-bearing layer. With the chart of Figure 3 it can then be calculated for the given oil production and the diameter of the casing at the pressure at which the casing is no longer sufficiently wide for the foam condition. If, as is now considered to be the case, the pressure at every height is known, it is also known, in view of the foregoing, what the least height is to which the tubing must reach; for instance, by means of Figure 3 for the diameter of the oil string and the oil production may be read the gas-oil ratio n at prevailing pressure. Substituting this in formula 14, which is directly deduced from formula 13 and the gas-oil ratio at atmospheric pressure for N, the formula gives the value of p at which the oil string becomes too narrow for a regular flow in the foam condition.

$$p = \frac{N}{n} \text{ atmospheres or:} \qquad (15)$$

$$p = \frac{N}{n} 14.7\text{—lb.} \qquad (15a)$$

The oil production and the gas-oil ratio at the pressure prevailing at the bottom of the tubing are known and the tubing is not made wider than the smaller of the respective critical diameters. It is then certain that the well will flow regularly. It is possible that the pressure or the quantity of gas present is not sufficient to lift the oil. This point will be put aside for the present.

If, as has been assumed, the pressure at every height is known, it would be possible, at least theoretically, to allow the diameter to increase gradually upward, so that at each height this corresponds to the smaller critical diameter for the pressure prevailing there. This, however, would not be the best method. Better to make the pipe narrower over the entire length, as the critical diameter is fixed in such a way that the velocity of the liquid is extremely small. The loss of energy through slippage is proportional to the time required by each liquid particle to rise in the well.[6] This loss of energy may be very great in the mist condition. In order to reduce this loss the tubing must be considerably narrower in general than the smaller critical diameter, for if the tubing is narrower, the velocity of rise is greater and the time required by the particle to travel through the pipe is the smallest. On the other hand, the velocity of the mixture of gas and oil may not be allowed to be very great, as too much potential energy is then converted into kinetic energy[7] and also because the turbulence resistance[7] would become too great.

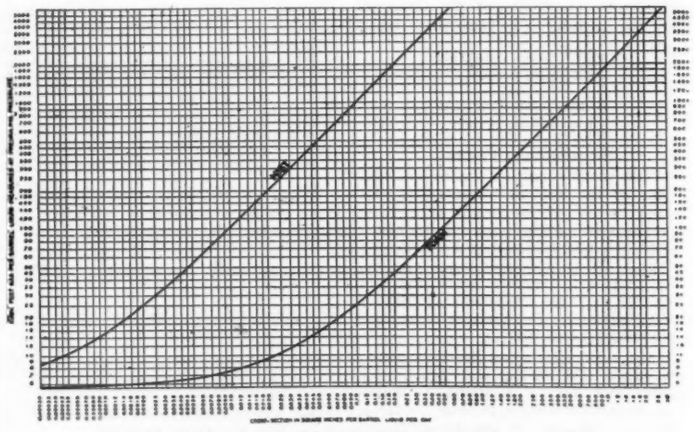
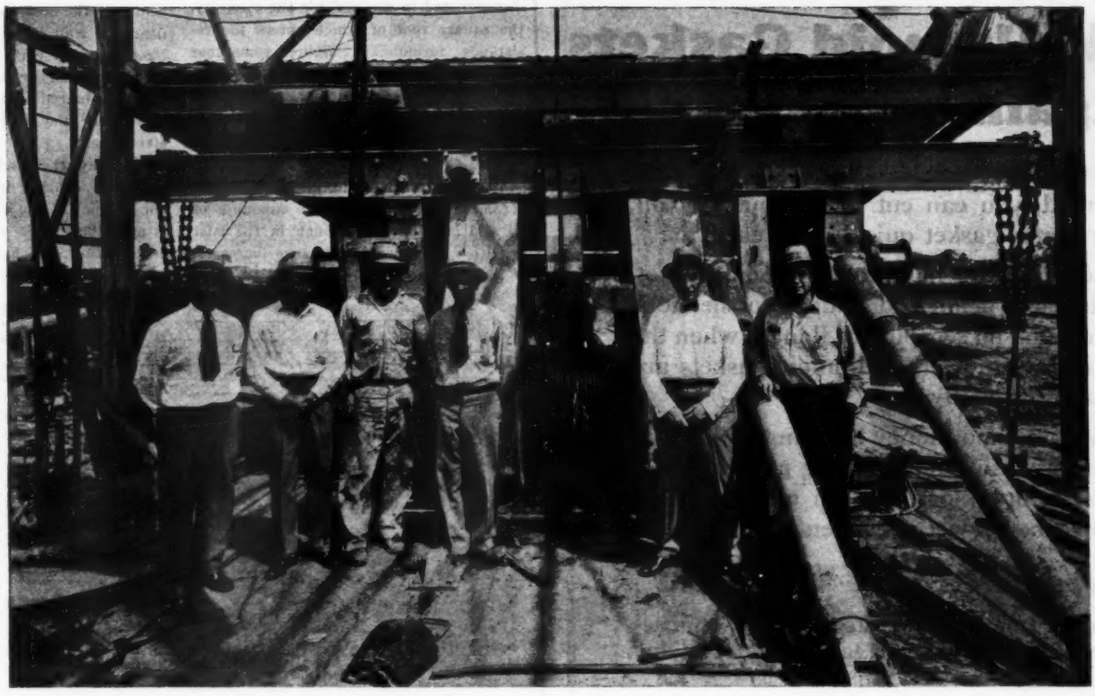


Figure 2—Limits of mist and foam conditions in tubing or casing.

The turbulence resistance is the least known of all losses of energy in the gas-lift[8] but often too much importance is attached to this. If this were of paramount importance, the wells should always flow best without tubing, while as a matter of fact the substituting of tubing for the much wider casing for lift pipe is the result of practical experience.

The diameter of the tubing, as has already been concluded above, must be either equal to or smaller than the smaller critical diameter at each height, in order to obtain a regular flow, but this must also be, in general, as small as possible in order to reduce the slippage loss. As has already been pointed out, however, the diameter must not be too small, in order to prevent too much potential energy from being converted into kinetic energy or being exhausted by turbulence resistance. Too great a velocity must in any case be avoided. The velocity de-

[6] J. Versluys: Op. cit., formula 21.
[7] J. Versluys: Op. cit., formulas 9 and 48.
[7] J. Versluys: Op. cit., formulas 11 and 50.
[8] J. Versluys: Op. cit.



This Union Line Stood the Test at Oklahoma City

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termines the kinetic energy, but also the loss of energy through turbulence resistance.

With respect to the loss of energy due to turbulence resistance, reference could be made to W. G. Heltzel's paper.[9] In the mist condition the drops of oil are disseminated in gas and for the viscosity, the square root of which enters the resistance formula, a figure sometimes greater than viscosity of gas would have to be substituted. Further, the specific gravity of the mixture, with which the turbulence resistance is proportional, is many times less than for oil or water.

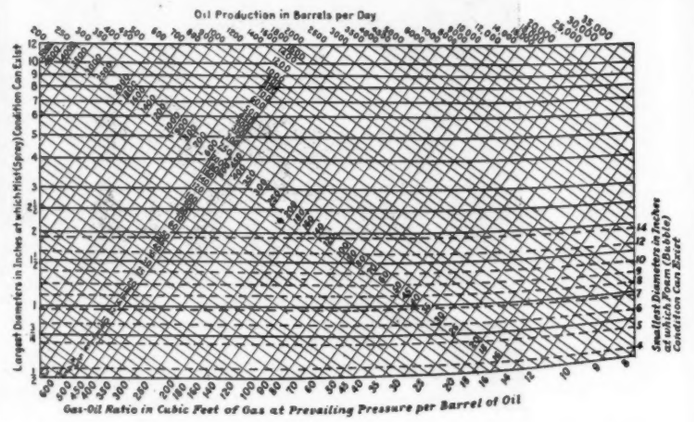
We must conclude that as the diameter becomes smaller for certain amounts of oil and gas flowing through in the mist condition, turbulence resistance increases, but not to such a degree as one is inclined to assume. From these considerations it may be concluded that a certain velocity of the rising mixture is favorable.

As the gas expands during its rise at the bottom of the well the tubing must not be smaller than is necessary to insure a good working, that is, not smaller than computed by the aid of the chart. Although the loss due to slippage may then be great in the lower part of the tubing, it will promote the most favorable condition higher in the tubing. If the velocity in the upper part of the casing should become very great, on account of the expansion of the gas, a tapered tubing can be used.

As far as the author knows, there are no data available concerning the resistance of a sudden enlargement of a pipe to the flow of a mixture of oil and gas. If we assume, however, that the law of the resistance of a sudden enlargement with a single liquid or gas applies to the mixture, then it follows[10] that such enlargements do not cause a considerable resistance if the density of the mixture is substituted.

The fact that the velocity of a liquid or a gas flowing through a tubing in the center of the cross section is greater than near the wall has not been appreciated. Probably this causes a small deviation, but errors on account of this will be counterbalanced by the exaggerated value chosen for the difference of speed b = 400 inches.

Probably the limits of the range of diameters causing intermittent flow are not sharp. If the value of the diameter is near the middle of the range of intermittent flow, the tubing will alternately


Oil Production in Barrels per Day
Largest Diameters in Inches at which Mist (Spray) Condition Can Exist
Smallest Diameters in Inches at which Plunger Lift Can Exist
Gas-Oil Ratio in Cubic Feet of Gas at Prevailing Pressure per Barrel of Oil

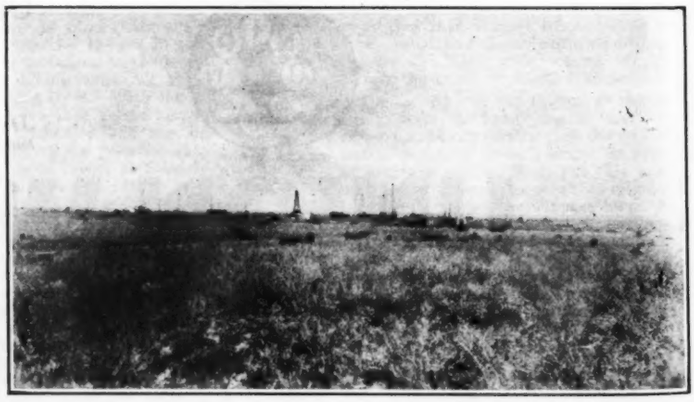
eject oil occluding little gas and gas containing a small percentage of oil in drops. The nearer the diameter approaches one of the limits, the shorter the period of intermittence will become and at last, but still before the critical diameters have been reached, one can speak of a regular flow, though the oil forms large, irregularly shaped bodes. Under these conditions, we may assume that the efficiency will be very small because the mixture of gas and oil is not intimate, owing to the fact that the difference of velocity b will be greater even than 400 inches, as has been explained. Wells that are not tubed according to these principles often cause trouble. It is difficult to bring them into production and the flow may cease suddenly.

By means of Figure 3, if the tubing is too wide to allow a regular flow for the amounts of oil and gas flowing through, the quantity of gas that must be injected to establish a regular flow can be computed.

[9] W. G. Heltzel: Fluid Flow and Friction in Pipe Lines; The Oil and Gas Journal (October 1, 1926, and June 5, 1930). C158-C171.

[10] H. W. King: Handbook of Hydraulics. Ed. 1, 181. New York, 1918. McGraw-Hill Book. Co.

PLENTY OF ROOM FOR DRILLING



PETROLEUM EXPOSITION OFFERS A REAL SHOW

(Continued from Page 316)

ings and in the completely finished product. The company maintains a large stock for the various gas engines at its shop in West Tulsa, the Improved Steel Gas Engine Head Co.

The following men represent the Sterling company at the oil show: R. O Shive, president; C. L. Harrell, vice president; J. W. Greene, district manager, Tulsa office, and J. S. Newlon, superintendent of shop in West Tulsa.

STEFCO STEEL CO.
55 Oklahoma Building

A small Stefco standard building illustrating many distinctive Stefco features is being exhibited by the Stefco Steel Co., Michigan City, Ind. The exhibit is in charge of L. L. Dresser, the Mid-Continent engineer, with offices in Tulsa. The company provides units which it says can be adjusted to virtually any industrial need.

SPARTAN STEEL CO.
20 California Building

The Spartan Steel Co., 1320 Alameda Street, Compton, Calif., manufacturers of an alloy steel, is exhibiting the application of its product to the various uses it can be put to in the oil industry.

S. K. F. INDUSTRIES CO., INC.
14, 15 California Building

The S. K. F. Industries Co., Inc., 40 East Thirty-fourth Street, New York City, has a display of ball bearings and their application to the various types of oil field equipment.

SOUTHERN MILL & MFG. CO.
1, 2 Oklahoma Building

The Southern Mill & Manufacturing Co., 515 South Troost, Tulsa, is exhibting one of its sectional buildings such as used by construction camps, oil field camps, etc. W. H. Ahrens, C. H. Ahrens and George Ahrens are in attendance.

SMITH WELDING EQUIPMENT CORP.
118 Texas Building

The Smith Welding Equipment Corp., Minneapolis, Minn., is exhibiting jointly with the Peerless Supply Co., Tulsa, which has the adjoining space, No. 119, in the Texas Building, and is distributor for Smith products. The Smith company is showing its complete line of welding and cutting torches. These torches are made largely of Monel metal, commonly used in the manufacture of oxyacetylene welding and cutting torches. The company guarantees to keep them in operating condition throughout the lifetime of the registered owner. In charge of the Smith display are John R. R. Miles, general manager, and C. E. Porte and Ira A. Cochran, factory representatives.

STOODY CO.
44, 45 Texas Building

The Stoody Co., Whittier, Calif., is displaying through the aid of photographs, laboratory samples and actual drilling bits, the various methods and processes used in applying metallic diamond substitutes and wear-resisting welded-on overlays to oil-field drilling bits.

In this connection there is shown for the first time flux-coated Borium which may be applied with the electric arc. This is the most recent development of the Stoody Co. in the application methods of tungsten carbide metallic diamond substitutes to oil field drilling tools.

Aside from this there is on exhibition the following equipment, all in operation suitable for use by oil field welding shops: The Universal oil tool grinder, Stoody Universal bit holder, Stoody combination grinder, with disc grinding attachments and a Stoody flexible shaft grinder.

The display is in charge of Miles C. Smith, manager of sales promotion, and J. C. Blake, general sales manager, of Whittier, Calif., and D. F. McCandlish, C. W. Rambo and R. L. Adams of the Tulsa district office.

A. O. SMITH CORP.
113, 114, 115, 116, 117 Texas Building

The A. O. Smith Corp., Milwaukee, Wis., is showing Smithweld electric-welded line pipe. Placards describe this product as to weight, thickness, capacity, etc. C. C. Joys, Jr., general manager of sales, is in charge of the exhibit and other representatives of the company are present.

SUN OIL CO.
52, 53 Refiners and Marketers Building

The outstanding feature of this display will be an entirely new very heavy pale oil which the company has quite recently started to produce. It is a wholly distilled oil with a viscosity of 145 to 160 at 210° F., and a 3½ N.P.A. color. A novel design of tilting rack showing a very slow movement of an unusually large air bubble will be used to demonstrate this new material.

Foaming of transmission lubricants has been a much discussed subject recently, so a demonstrator will be operated continuously to show that Sun transmission lubricants are free from this drawback.

In addition, there will be an artistically arranged display of Sun oils and greases. This is arranged so that the samples are illuminated and are grouped with a sunburst background including a silhouette of a refinery.

THE SHERWIN-WILLIAMS CO.
53-54 Oklahoma Building

The Sherwin-Williams Co. is exhibiting several of its products among a big line of paints, varnishes, enamels and protective coatings manufactured particularly for the petroleum industry. It is featuring Lyne-Kote, high melting point coal tar pipe line coating; Petro-Seal, for the sealing of interior oil and gasoline tanks, and Sherwin-Williams gas-proof paints for interior and exterior use.

Attending are Arthur Larkins and K. B. Keyerleber, Cleveland, Ohio; W. P. Clark, Kansas City Mo., and A. W. Everett and W. F. Adams, Tulsa.

SPERRY-SUN WELL SURVEYING CO.
29, 30 Scientific and Technical Building

The Sperry-Sun Well Surveying Co., Philadelphia, Pa., is featuring the following instruments: Surwel gyroscopic clinograph complete, used for making surveys of wells or bore holes and giving inclination as well as orientation of the drift; Syfco clinograph, used in the daily testing of vertical drift of bore holes; side wall sampler, used for obtaining side wall samples from bore holes; model gyroscope, for demonsrating the principle of the gyroscope; Scorsby machine for demonstrating the Surwel clinograph in actual operation.

In addition, the above company is showing one of its completely equipped Surwel service trucks, with instrument room and dark chamber for developing films immediately upon the completion of a survey out in the field. This truck is located in the open space alongside the Autocar exhibit.

In charge of the booth are G. L. Kothny, vice president; Morton T. Higgs, manager Dallas, Tex., office; W. H. Emerson, assistant manager Dallas office, and A. B. Palmer, sales engineer.

SOUTHERN PINE ASSOCIATION
Open-air Space

An exhibit which serves to bring back older days of production, and yet which shows a trend of modern thought in engineering and design for oil field use, is the all-wood derrick by the Southern Pine Association, headquarters in New Orleans, La.

Several years ago the lumber manufacturers learned that poor grades of lumber and poor use of lumber had been foisted upon oil producers. Because of poor qualities and grades and because of the wrong use of lumber, wooden derricks were not as long-lived as in the earlier days. Therefore, the Southern Pine Association, the West Coast Lumbermen's Association and the National Lumber Manufacturers Association made studies and investigations looking to the proper design of an all-wood derrick, giving proper strength values for the loads to

BUSINESS IS GOOD

There's A Reason

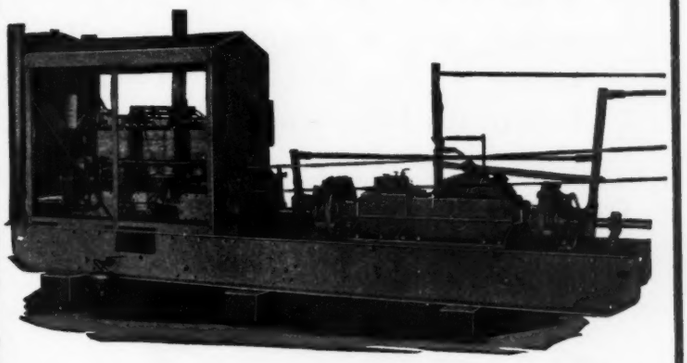
A few of the many exceptional records held by Young Engines

YOUNG ENGINES hold the record for drilling one of the deepest holes in the world with a gas engine (7818 feet).

YOUNG ENGINES 3378 feet deep in 27 days
4568 feet deep in 46 days

YOUNG ENGINES 28 Young drilling engines now in operation by one company, 15 by another corporation.

See Youngs Drilling Engine 95 R.B. at Tulsa



An Engine for Every Requirement in the Oil Field

Information: Booth No. 10 Arcade

Ask About Young's New Diesel Drilling Engine

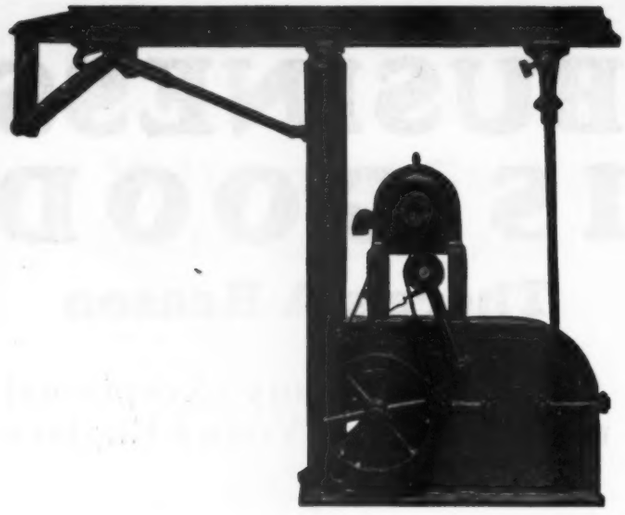
YOUNG ENGINE CORPORATION

BRANCH—SWEETWATER, TEXAS

CANTON OHIO

Representatives—

Federal Supply & Machine Co., Winfield, Kansas
Lawrenceville Machine Co., Lawrenceville, Illinois
Branchland Supply Co., Huntington, W. Va.
J. F. George, Kane, Pa.



Mechanically Correct Oil Well Pumping Powers

Fabricated with "H" Beam for Sampson Post and Walking Beam.

Toggle made from steel casting.

Interchangeable bronze bearings throughout.

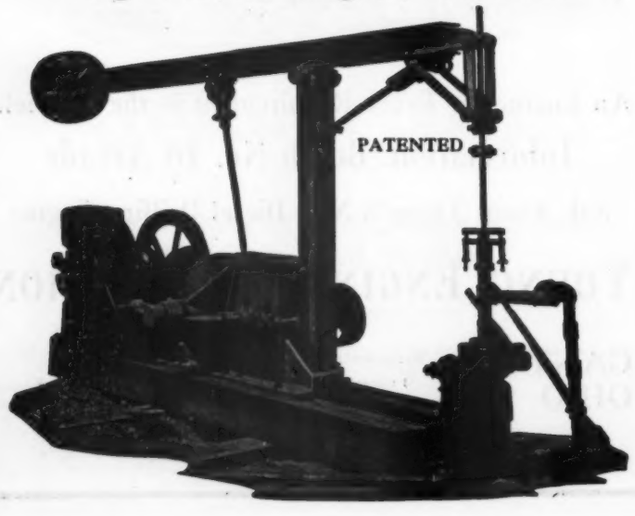
Cut gears running in oil.

Patented cam motion keeps polish rod in alignment at all times.

Can be used to pump from one to three wells.

Stork Engineering Company

Saginaw, Michigan, U. S. A.



be carried, after which the Southern Pine Association erected the derrick in Tulsa in exact conformity with the findings of the best engineers.

The Southern Pine Association has not only built this derrick as an engineering-study result, but has named all the grades of Southern Yellow Pine which should be used, giving to the oil industry a derrick at low cost which it asserts will carry more than any load which will ever be applied even in deep drilling. This derrick can be bought in semifabricated condition from several sawmills.

SHELL PETROLEUM CORP.
24, 24 Refiners and Marketers Building

The Shell Petroleum Corp., St. Louis, Mo., is using its booth for an attractive display of its petroleum products, with several representatives of the company in charge.

SHAND & JURS CO.
37 California Building

Shand & Jurs Co., Berkeley, Calif., is exhibiting a varied line of its products in tank equipment. In the display are Spark Proof gauge hole covers, gauge well covers and manhead covers, vacuum and pressure vent valves, breather valves, Beco flame arrestor, safety internal tank valve, automatic tank gauges, cable winches, fire hose, gasoline gate valves, loading rack swing joints, cast steel tank nozzles, swing joints and A.P.I. standard drain elbows, cable sheave brackets.

Safety features in connection with the transportation of inflammable liquids are shown and a miniature typical installation of safety devices on a large capacity gasoline truck is displayed.

TITUSVILLE IRON WORKS
60 Texas Building

The Titusville Iron Works will not show any equipment, but will maintain a reception booth, No. 60 Texas Building. Those in attendance include John T. Dillon, president of the company; John T. Dillon, Jr., vice president; Robert E. Dillon, vice president; Theodore Worth of the Tulsa office, in charge of refinery equipment, and B. F. Kelly, in charge of oil field equipment.

TEMPLETON, KENLY & CO., LTD.
42 Texas Building

Templeton, Kenly & Co., Ltd., of Chicago, are exhibiting their complete line of Simplex lifting jacks, ranging from 1-ton to 35-ton capacity. The principal model is the No. 310 Simplex emergency jack.

New types include the Simplex pipe pushing jack for pushing pipe underground, the Simplex screw jacks for general service, and the Simplex heavy-duty jacks for tank construction.

H. B. Burlow, vice president, is in charge of the exhibit.

TULSA OVERALL AND MANUFACTURING CO.
66 Refiners and Marketers Building

The display of the Tulsa Overall and Manufacturing Co., Tulsa, comprises a line of work clothes manufactured by that corporation, including vat-dyed, sweat-proof, preshrunk and semishrunk herringbone twills manufactured into pants, shirts, magicalls, smocks, play suits, aviation suits and overalls. There are denims, ducks and many other materials. The trade name of this company is "Magic Brand," and the exhibit this year is the company's second at the Petroleum Show, it having been organized only 15 months ago.

THE TAPPAN STOVE CO.
64 Scientific and Technical Building

The display of the Tappan Stove Co., Mansfield, Ohio, consists of domestic gas ranges especially equipped for use with liquefied petroleum gas. It also has available technical data on the operation of the ranges and samples of sales promotion matter used in the development of this new business.

Oil companies have recently become interested in the creation of this new market and this exhibit provides opportunity to discuss the field for sale and the methods of developing it.

D. O. Meese and W. M. Bonnell represent the company.

C. J. TAGLIABUE MFG. CO.
32, 33 Scientific and Technical Building

C. J. Tagliabue Manufacturing Co., Brooklyn, N. Y., occupies Booths 32 and 33 Scientific and Technical Building with a complete line of laboratory and plant instruments for oil refineries. A feature of the exhibit is the new TAG Saybolt thermostatic Viscosimeter and the new TAG Nu-Typ hydrometer. Other instruments on display are thermometers, hydrometers and standard oil testing instruments for the laboratory, also industrial thermometers with Tag-Hespe feature; recording and indicating thermometers, together with a complete line of temperature, pressure and liquid level controllers for the plant.

TURBO MIXER CORP.
61 Scientific and Technical Building

The Turbo Mixer Corp., New York, is showing working models of Turbo-Contacter for the contacting of fuller's earth and oil, showing the high speed with which the Turbo-Mixer breaks up the fuller's earth to its ground particle size, resulting in faster contacting and lower earth requirements. It is showing also a working model of the continuous Turbo-Treater for treating oils and distillates, a working model of the Turbo-Mixer for the instantaneous preparation of drilling mud and large sized impellers.

TRIMONT MANUFACTURING CO.
100 Oklahoma Building

Chief among the Trimo tools exhibited by the Trimont Manufacturing Co., Roxbury (Boston), Mass., is the company's New Improved and Mightier pipe wrench,

shown in the accompanying illustration. This wrench has been known in the oil fields and other heavy-duty work for 40 years.

The company is featuring also the new Trimo safety insert jaw, with the assertion that the Trimo wrench will not fly off a twisted sucker-rod if it is equipped with this special jaw, which is said to afford real protection for the sucker-rod crew.

Among other items tools in the exhibit are the Trimo heavy-duty monkey wrench, chain wrench and a complete line of cutters and vises.

TULSA RUBBER PRODUCTS CO.
54 Texas Building

The Tulsa Rubber Products Co., Tulsa, is displaying different items in rubber which are handled by the company, including Silvertown tires and tubes, airplane tires and accessories, Goodrich Highflex belting, rubber anode electrician gloves and acid gloves for refinery use, packing, all types of rubber hose, including garden, water, welding, gasoline, suction, steam and air, also rubber boots and shoes for oil field service.

N. W. Franklin is in charge of the booth.

TAYLOR INSTRUMENT COMPANIES
35, 36 Scientific and Technical Building

This year the Taylor Instrument Companies, Rochester, N. Y., again will fill two booths with a line-up of Tycos instruments for the petroleum industry, including instruments for indicating, recording and controlling both temperatures and pressures, viscosimeters, barometers, vacuum gauges and many other devices that find application in the field and in the refinery.

Representatives from the home office in Rochester and members of the Tulsa branch are A. J. Fleig, E. H. Triphaus, L. G. Marsh, D. R. Davis, H. A. Brown, E. C. Taylor and Frank Rees.

TRANSCONTINENTAL OIL CO.
34, 35, 36 Refiners and Marketers Building

The main exhibit of the Transcontinental Oil Co., Tulsa, represents the oil industry as a whole in miniature. In one corner is a small drilling well, while directly behind it are two pumping wells. All are in operation and the pumping wells are actually pumping oil. The pipe line is shown together with pump station, tanks, and a small casinghead gaso-

line plant. The feature is a miniature refinery showing stills, agitators, water spray pond, boiler house, filter house, and other units used in a refinery. Most of the units are in actual operation. The distilling unit distills crude oil, taking off gasoline, kerosene and fuel oil.

The exhibit is larger and better than the previous exhibits of the company, which is showing also various Marathon products manufactured by the company.

THE TEXAS COMPANY
31, 32 Refiners and Marketers Building

The Texas Company, Houston, Tex., has a complete showing of Texaco products, including lubricating oils, greases, asphalts and roofing paper. The booth is in charge of J. W. Wallace, representative of the company in Tulsa.

TULSA PUBLIC LIBRARY
13 Scientific and Technical Building

The Technical Department of the Tulsa Public Library exhibits a complete collection of petroleum books and magazines. Reference questions are answered and bibliographies distributed. The exhibit is in charge of Miss Florence Lundell.

TUBE-TURNS, INC.
22 Oklahoma Building

Tube-Turns, Inc., Louisville, Ky., is showing tube-turns, the seamless short-radius uniform wall fitting for pipe welding, in stock sizes 1-inch through 18-inch standard iron pipe sizes and 1½-inch through 12-inch in extra-heavy iron pipe sizes. Both the standard and extra-heavy are shown in 45° elbows, 90° elbows and 180° returns. Tube-turns of special materials, such as the new stainless steel and corrosion-resisting alloys and brass, copper and aluminum also are exhibited.

In addition to the product itself, the booth contains life-size photographs showing Tube-turns being installed in piping systems and other photographs showing them installed in refinery pipe lines and equipment.

John G. Seiler, sales manager, and James T. Howington are in charge of the exhibit, assisted by William Moorer, representing the Moorelane Co., Tulsa distributor, and Joseph Peddie, representing the Maintenance Engineering Corp., Houston, Tex., distributor.

TIMKEN ROLLER BEARING CO.
72, 73 Texas Building

The Timken Roller Bearing Co., Canton Ohio, is featuring a display designed to show the capacity of the bearings for carrying thrust loads, as well as the reduction they effect in friction. This consists of a steel mill type bearing, weighing about 500 pounds, mounted on a vertical shaft, the whole suspended weight being carried by a small bearing. The shaft is driven by a small electric motor, using a fish line for a belt. The rest of the exhibit consists of an assortment of bearings suitable for use in various types of oil-field equipment.

The company is represented at the exposition by L. M. Klinedinst, vice president; H. I. Barth, district manager of industrial sales, Dallas, Tex.; R. P. Proffitt, district manager of industrial sales, St. Louis, Mo.; J. A. Robinson, district manager of industrial sales, Birmingham, Ala., and G. W. Curtis, district manager of industrial sales, Pittsburgh, Pa.

TWIN DISC CLUTCH CO.
80 Oklahoma Building

The Twin Disc Clutch Co., Racine, Wis., is showing a 42-inch oil field type of clutch, mounted on a countershaft of a rotary drilling rig. It also is exhibiting a heavy-duty power take-off unit with 18-inch clutch and a few loose clutches of various types and sizes.

TULSA CANVAS PRODUCTS, INC.
Lot H, Open-air Space

Tulsa Canvas Products, Inc., Tulsa, is showing tents, awnings and canvas goods useful in the oil country. The company's products include also window shades, automobile tops, seat covers, wagon covers, paulins, van pads, laundry bags, etc.

THE UNIVERSITY OF TULSA
18 Scientific and Technical Building

The three basic sciences underlying the petroleum industry are featured in the University of Tulsa exhibit. Experiments involving qualitative and quantitative analysis, organic chemistry and physical chemistry are under the supervision of Dr. R. J. Kaufmann and Dr. F. T. Gardner, Chemistry Department. Dr. A. N. Murray and Dr. L. R. Laudon, Geology Department, display index fossils of the Paleozoic and tests of common minerals. Prof. M. S. Waddell, Physics Department, conducts a series of physics experiments.

Information regarding the petroleum engineering courses, co-operative methods of training and the University of Tulsa is available at the booth.

UNION CARBIDE & CARBON CORP.
17, 18, 19, 20, 21 Texas Building

Several units of Union Carbide & Carbon Corp., New York, exhibit jointly. Booths 17 to 21 are occupied by the following subsidiary companies of the corporation: The Linde Air Products Co., Oxweld Acetylene Co., Union Carbide Sales Co., Haynes Stellite Co., and the Prest-O-Lite Co., Inc.

An interesting feature of the exhibit is a guessing contest on the tensile strength of oxy-acetylene welded coupons pulled on an Oxweld portable tensile testing machine.

Another feature is an illuminated map showing the corporation's nation-wide facilities for the production and distribution of everything for oxwelding and cutting. This is supplemented by a complete display of the various products used in the oil and gas industry, including oxweld welding and cutting blowpipes and accessories; Prest-O-Weld blowpipes and accessories; Oxweld Type MP-2 portable generators, Haynes Stellite welding rods and drilling tools; Union carbide and carbic in drums, and Carbic floodlights.

Those in attendance at the booths include H. H. Griffith, of the New York office; and W. S. Winn, A. C. Johnson, L. B. Moon and other representatives of the various companies exhibiting.

UNIVERSAL ENGINEERING CO.
36 and 37 Texas Building

The Universal Engineering Co., Los Angeles, Calif., has an exhibit of its Zublin engineering bits. In attendance is J. B. Porter.

UNION WIRE ROPE CO.
55, 56, 57, 58 Texas Building

The exhibit of the Union Wire Rope Co., Kansas City, Mo., is a mechanical one, illustrating by miniature landscapes the central position where the company's plant is located in the United States to serve the oil industry. A miniature train leaves the plant in Kansas City, with a carload of rope. It runs from there to the lumber country, then to the mining country and last to the oil fields. At each section of the country the train stops and unloads a reel of rope.

There are many interesting novelties to be seen in this landscape. The action of loading, unloading, stopping of train, working of signals, gates, oil wells, mines, etc., are all done mechanically.

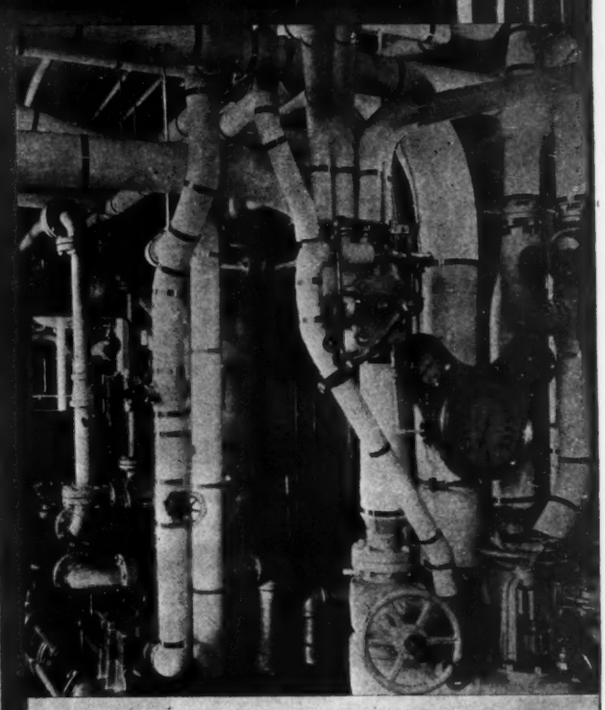
VICTAULIC CO. OF AMERICA
103, 108 Texas Building

The Victaulic Co. of America, New York, has a full display of pipe couplings, together with a moving picture illustrating installations.

VINSON-CANTER CO.
6, 7 Refiners and Marketers Building

The Vinson-Canter Co., Tulsa, is showing in Booths 6 and 7, Refiners and Marketers Building. Equipment exhibited includes V.-C. Wick-Lube air filters, manufactured by the Vinson-Canter Co. Nicholson Industrial steam trap, manufactured by W. H. Nicholson & Co., Wilkes-Barre, Pa., Copes boiler feed regulator, Copes Type DS pump governors, Copes Type SS differential water pressure regulating valve, Copes Type OT regulator for oil field type boilers, all manufactured by the Northern Equipment Co., Erie, Pa. The supervisors of

PIPING by Power Piping
FOR EVERY OIL FIELD NEED



Men, Methods and Materials . . .

Behind every important fabrication or installation executed by Power Piping Company is a background of men, methods and materials that can result in but one standard of service and satisfaction!

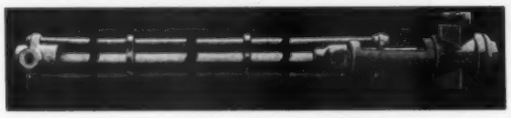
Refineries and power plants appreciate that by letting the contract to this capable organization the specifications will be carried out to assure accuracy in design and economy in operation. Put your piping problems up to

POWER PIPING COMPANY
PITTSBURGH, PA.

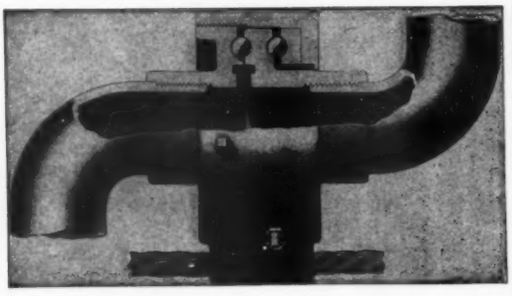
FROM A MERE FITTING TO A COMPLETE SYSTEM

Two new specialties... and a dozen others to be displayed by MacClatchie in Booth 110, Okla. Bldg., at the oil show.

. . . the boiler feed-water regulator (new)

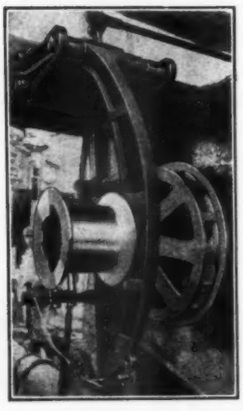


. . . the all-steel rotary hose (new)



. . . the rotary under-reamer

. . . the automatic safety cathead



. . . of course, the famous mud pump valve

. . . along with the cement head, lubricated stop-cock, quick union, flow nipple and bean, geared draw-works brake, puller for valve seats and pump liners, and other MacClatchie Quality Products. You are cordially invited to drop in at our booth. MacClatchie Mfg. Co., Compton, Calif., with branches in Houston, Ventura, Bakersfield.

the exhibit are V. C. Canter and B. W. Wilson of Tulsa; Don Allshouse, Erie, Pa., and V. V. Veenschoten, Erie, Pa.

VICTOR WELDING EQUIPMENT CO.
46 Texas Building

The Victor Welding Equipment Co., San Francisco, with distributors and service stations in principal cities, is demonstrating metal cutting with oxygen and liquid petroleum gases. A complete line of Victor pipe line and refinery welding equipment, together with the latest Victor senior and junior safety regulators, is shown.

Cutting, welding and brazing equipment for natural gas and oxygen is demonstrated by A. S. Heasley and E. A. Daniels, both representatives of the company's engineering department.

WEBSTER ENGINEERING CO.
Lot O, Open-air Space

The Webster Engineering Co., combustion engineers, Tulsa, has an exhibit showing Wilgus regulators, Anubis meters, and Webster gas burning equipment. The Wilgus regulator and the Anubis meter are a new line of equipment just taken over by the company.

Representatives of the company present are Oscar F. Kluenter, Donald Torr, L. S. Reagan, W. J. Combs and J. E. Farrand.

WAUKESHA MOTOR CO.
89, 90, 121, 122 Oklahoma Building

The Waukesha Motor Co., Waukesha, Wis., is showing two oil units which it has been developing over a period of several years. These engines are of the light-weight, full Diesel type. They have had thorough try-outs in the company's laboratory and in the field. They are of peculiar interest owing to the fact that they are built on the same crankcase with the same bearings as the company's standard gasoline engines.

WEST COAST LUMBERMEN'S ASSOCIATION
10, 30, Lot M, Open-Air Space

The display of the West Coast Lumbermen's Association consists of a walking beam and a samson post of structural grade Douglas fir. The walking beam is rigged up to show it as though in actual operation. Association representatives in charge of the display are L. P. Keith and Don Critchfield. Copies of the association's technical bulletins on Douglas fir are available from these men.

WESTCO-CHIPPEWA PUMP CO.
12 Arcade

The Westco-Chippewa Pump Co., Davenport, Iowa, manufacturer of Westco turbine pumps, is exhibiting its special still charging unit, employing a two-stage pumping unit, operating up to 350 pounds pressure per square inch. It handles raw feed gasoline 100° A.P.I. It can be furnished in many different sizes and equipped for motor, steam turbine or belt drive. This unit gives a steady nonpulsating flow and is said to result in large gasoline recovery because it eliminates the overload and underload of the stabilizer trays. These pumps do not gas-bind, according to the manufacturer. A special feature is the relieving of pressure on the stuffing boxes, which prevents leakage, scoring of shafts, etc.

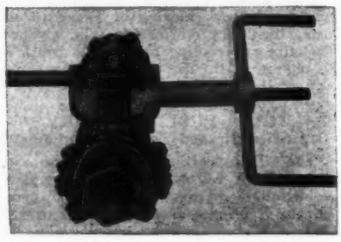
There also is exhibited a specially constructed Westco pump for handling propane reflux. The Westco turbine principle makes it possible to use small diameter impellers when operating at relatively slow speeds, preventing gas binding. The stuffing boxes are made extra deep to prevent leakage. They are also equipped with lantern rings and alemite fittings, resulting in greater length of life of the packing.

A Westco specially constructed hot oil pump with water jacketed stuffing boxes is on display. It is asserted that due to the Westco turbine principle of pumping, pressures can be developed in single-stage construction that ordinarily would require multistage centrifugal pumps. An operating exhibit shows the high head operating characteristics.

E. B. WIGGINS OIL TOOL CO., INC.
78 Oklahoma Building

The E. B. Wiggins Oil Tool Co., Inc., Los Angeles, Calif., is showing Wiggins underreamers, reamers, yoke type roller bearing disc bit, free circulation drill pipe and casing protector, rubber grip rotary hose coupling, hose clamp gathering device, hose coupling press, servicing fixture and collapsed casing expander.

The Wiggins digging combine is a combination of the Wiggins straight hole reamer and the new Wiggins roller bearing yoke type disc bit. All the cutting surface of the Wiggins disc bit is self-sharpening, and the disc bit is an all-formation bit suitable for penetrating practically all formations.



The Wiggins reamer has 26 reaming edges. The teeth are so placed that they completely contact the circumference of the hole and insure the hole being full gauge and round, whether the tool is spudded or rotated to bottom. Every cutter (there are from three to six) on a Wiggins reamer has eight edges or the equivalent of a double four-point reamer in itself.

After two years of experimental work and many trial runs, the company is placing on the market a free circulation, quick attachable casing protector. This protector is made by vulcanizing tire rubber onto fabric and is held on the drill pipe by means of several special alloy wires. The protector is split to allow its being slipped around drill pipe. Owing to vertical grooves on the outside, ample room is left for circulation and there is no swabbing action. By cutting the wires the protectors can be removed and used again.

WESTCOTT & GREIS, INC.
39, 40, 41, 42 Scientific and Technical Building

Westcott & Greis, Inc., Tulsa, are exhibiting meters of all types, manufactured by the Metric Metal Works, Erie, Pa.; gauges and relief valves, manufactured by the Crosby Steam Gauge & Valve Co., Boston, Mass.; Robinson orifice fittings, manufactured by the Robinson Orifice Fitting Co., Los Angeles, Calif.; regulators manufactured by the Reliance Manufacturing Co., Alhambra, Calif.; tank equipment manufactured by Westcott & Greis, Inc.; Davis regulators, manufactured by the Davis Regulator Co. of Chicago, and the under-pavement boring machine, manufactured in San Francisco by the Auger & Boring Machine Co., Ltd.

The type M regulator for bottled gas is an automatic device for partly reducing the pressure before it goes to the regular service regulator, and it has a dial connection which is installed in the house, through which no gas passes. This dial advises the customer automatically when one tank has been exhausted. The device also protects the apparatus, as it allows both tanks to be turned on for service at all times, only utilizing one bottle until it is exhausted and then automatically putting the other tank in operation.

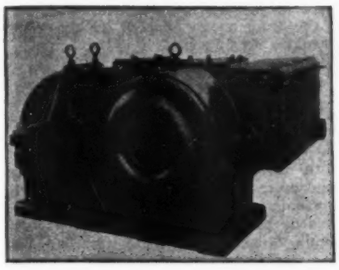
This eliminates the necessity of going out to turn on the second tank or bottle, and it protects the customer when using pilot lights against the exhaustion of one tank. Besides this, it reduces the operating conditions on the service regulator, so that the regulator is doing a more moderate job of work, thus increasing its life.

The boring machine is for boring holes under pavements, sidewalks, highways, etc., thus removing the need of tearing up concrete pavements for the laying of

pipe lines. This machine is operated by a compressed air motor, with a combination dry and wet drill, and is said to have drilled holes up to 142 feet in length with a variation of only 1¼ inches from dead center. Under certain soil conditions this machine is said to have attained a speed of 4 feet per minute. At present it is made in only two sizes, one of which will take care of any pipes up to 3-inch wrapped pipe, or 4-inch plain pipe, and the other of which will take up to 8-inch wrapped pipe or 10-inch plain pipe.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
85, 86, 125, 126, 127 Oklahoma Building

As a part of its exhibit the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., is displaying the new Westinghouse Nuttall OP-300 pumping gear unit. The OP-300 line of pumping gears provide complete drive for pumping wells requiring 5 to 40 horsepower at 8 to 32 strokes per minute. These drives are built in three sizes to cover the operating range. All units are similar in appearance and differ only in size. A triple reduction gear, motor and control



are assembled into one weather-proof self-contained unit, which may be connected to the pitman on a standard rig, or supplied complete with a Samson post walking beam and pitman.

The exhibit also includes the new Visicode supervisory control equipment, which provides a means for remotely controlling and supervising a large variety of power apparatus, and operates over only two line wires similar to those used for telephone purposes. Several remote stations may be operated on the same two line wires. The Visicode is an all-relay supervisory control using the same type of relays and employing the same fundamental principles of circuit design as used on the first successful supervisory control built by Westinghouse for the Cleveland Railways Co. in 1921.

Two small ornamental derricks bear transparencies showing representative installation views of electrical equipment which the Westinghouse company manufactures for the oil fields. These transparencies include views of oil field pumping, drilling with alternating current equipment, drilling with direct current equipment, steam rig lighters, heat exchangers, small mechanical drive turbines for driving pumps, arc welding equipment and pump line pumping installations.

WILLARD STORAGE BATTERY CO.
93 Oklahoma Building

R. S. Van Cleve, western industrial sales manager, and N. A. Hintz, special sales representative for the Willard Storage Battery Co., Cleveland, Ohio, also J. L. Shannon, manager of the Kansas City district for the above company, are in charge of their booth at the oil exposition in October. The display consists of all types of batteries for automobile, radio, airplane and motor boats, also all kinds of oil field equipment using storage batteries.

WILSON & BENNETT MFG. CO.
39 Refiners and Marketers Building

A complete showing of lithographed steel cans, drums and pails represents the Wilson & Bennett Manufacturing Co., Chicago. In this exhibit are included every type of steel container used by the petroleum industry for the shipment and sale of its products. The feature of the display is a continuous pouring demonstration to illustrate this feature of the Por-Pail.

WORTHINGTON MACHINERY CORP.
Worthington Building, Block L

The Worthington Machinery Corp.'s exhibit is located in its own building in Block L, immediately north of the center of the Oklahoma Building, and consists of centrifugal pumps, power pumps, direct acting steam pumps, air compressors, multi-V-drives, steam turbines, gas engines and electric motors which have been primarily designed or modified to meet the conditions of oil field service.

Every unit shown at the Worthington exhibit is regularly carried in stock in their warehouse at 424 North Boulder Avenue, Tulsa. The complete units shown in this exhibit consist of the following:

A special salt water pump constructed of acid-resisting bronze and stainless steel having a capacity of 350 g.p.m. against a 400-foot head. This unit is direct connected to and driven by a 60 horsepower, 3,500 r.p.m. Terry steam turbine.

A 30,000-bbl. main oil line centrifugal pump is shown direct connected to a 250 horsepower, 3,500 r.p.m. electric motor.

A 1,000 g.p.m., 350-foot head, two-stage centrifugal oil or water pump is shown direct connected to and driven by a 125 horsepower electric motor. One of their totally inclosed horizontal power pumps is shown which is driven by a 100 horsepower Hercules gasoline or gas engine. The power is transmitted through multi-V-belt drive, which is one of the new products recently placed on the market by Worthington. Two types of compressors are exhibited, one being a 7x6 duplex vertical feather valve compressor direct connected to an electric motor, the other being a 6½x6 single cylinder vertical feather valve compressor driven by an electric motor through a Worthington multi-V-belt drive.

A new 10x4½x10 duplex direct acting steam pump with divided piston rods and removable liquid cylinder linings is also shown. A Metalweld Worthington portable air compressor unit, driven by a gasoline engine, is being exhibited for the first time in Tulsa.

The Worthington representatives who will be at this exhibit will be as follows: J. J. Summersby, F. B. Applegate, H. D. Cornell, F. W. Dye, J. E. Duffey, J. A. Lupfer, J. H. Feemster, J. O. Lewis, Olaf LaCour Olsen, Walter D. Smith, David Wallace, J. A. Grey, O. E. Smith and S. C. Ashcraft.

WERTZBERGER DERRICK CO.
Open-air Space

The Wertzberger Derrick Co., Tulsa, manufacturers of oil field tubular derricks and allied equipment, occupies the same open-air space as last year. The 122-foot rotary derrick has been erected together with the Fraser pipe rig front. This derrick is said to have the greatest crown block capacity, by the A.P.I. rating, of any unreinforced derrick on the market.

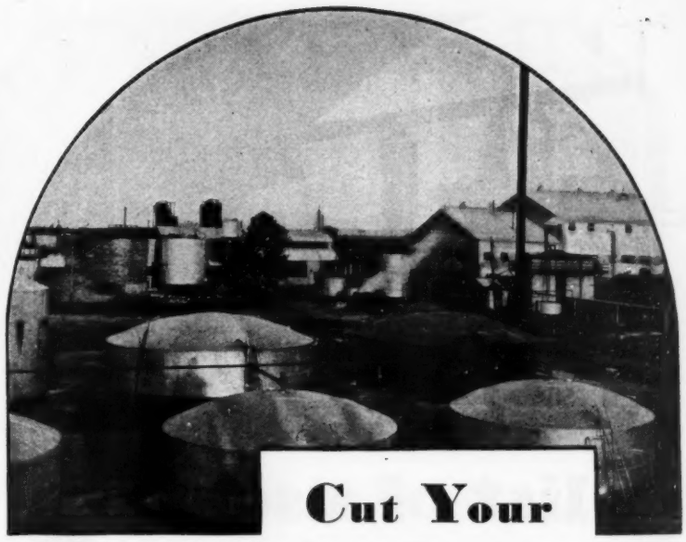
The Dunham oil encased crown block bearing and pitman bearing, which are now owned and manufactured by this company, will be shown.

George L. Bovee is in charge of the exhibit. Edward F. Kelley, chief engineer, is on the grounds to discuss construction and erection details.

WALWORTH CO.
104, 105, 106, 107 Oklahoma Building

Drilling gate and line gate valves, the new Walco wrench and, in particular, two new bronze gate valves made especially for oil service are featured by the Walworth Co., Boston, Mass. In addition, the company is displaying its complete line of bronze, steel and iron body valves for production, refinery and pipe line service. Sectioned valves, mounted on swivel stands, are installed for inspection by visitors. The three items mentioned are new and Walworth engineers say they represent years of study.

The drilling gates and line gates are all steel valves for top-of-the-well service, recommended for working pressures ranging from 500 to 3,000 pounds. These valves are equipped with the new tiller type hand wheels, with protruding spokes to facilitate quick and easy op-



Cut Your
Depreciation Account ⅔

WHAT would you think of a proposition that could triple the life of your property at a negligible increase in first cost.

Granite City Copper Bearing Steel sheets and plates offer this unusual saving. Under test they show approximately three times the life of ordinary steel without copper content. Depreciation may be reduced about two-thirds.

Many tank manufacturers are supplying Granite City Copper Bearing Steel on specification now. Builders, too, will gladly include this extra long wearing steel on specification for other construction use, such as roofing, siding, etc.

The money-saving facts about copper bearing steel are at your disposal. Write for free booklet.

Unusual shipping advantages to jobber and fabricator in the Mississippi Valley, the West and the Southwest from our ideal location in Granite City, Ill., 20 minutes from Saint Louis, served by 29 railroads and the Mississippi River.

Circles, semi-circles and plates in corrosion-resisting copper bearing steel if desired. Three times the life of ordinary steel.

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Galvanized, Blue Annealed and Black Sheets - Plates and Tin Plate

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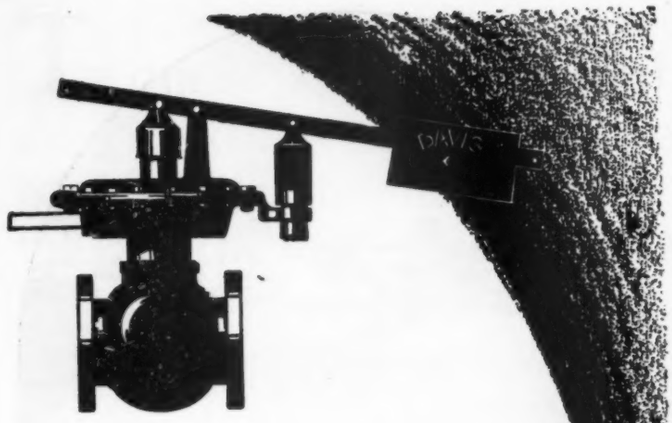

A list of users is a catalog of the Industry

THE Davis Casinghead Gas Regulator is used by natural gasoline manufacturers everywhere. The largest producer is largest user.

This time tested automatic valve gets maximum recovery—the sensitive control maintains accurate well vacuum regardles of the suction line vacuum.

Simple, rugged construction and full protection from the weather maintains accurate performance with very little attention. Send for catalog No. 11 with complete data on Davis automatic pressure control equipment for oil field service.

Davis Regulator Company
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Sales Engineers
TULSA LOS ANGELES DALLAS

Automatic valve makers for over fifty years

DAVIS VALVE SPECIALTIES

OGJ 10-2 Gray

eration in an emergency. The valves are made of Walworth Sigma steel, the products of a special foundry technique developed through the use of X-ray studies to determine and remedy interior defects commonly found in ordinary steel castings.

The new Walco pipe wrench was designed particularly for the rough treatment given tools in the oil country. It has the general shape and design of the Stillson wrench, but is made of all drop forged steel with bar and frame in one piece. This enables the wrench to withstand severe shocks and strains, such as are imparted when a wrench is used as a hammer, lifting tool, crowbar, etc. The Walco display includes a demonstration of the wrench in which an attendant hammers flat a piece of extra heavy steel pipe, using the wrench frame as a hammer head.

WICO ELECTRIC CO.
126, 127 Texas Building

The Wico Electric Co., Springfield, Mass., has a cabinet which exhibits several of the company's older types of magnetos, well known to the field. They are exhibited in operation to show the action of the magneto, and the exhibit includes a number of the various models partially dismantled so that the entire construction may be visible at a glance. In these types are the models which have given the company its prestige in the oil fields because of their ability to stand abuse and hard work under adverse conditions. The design of the magneto fundamentally correct for the sort of service they are adapted to can be improved little, but several changes have been made in the more widely used OC oil field type to increase its already long life.

The company also exhibits a new type of magneto for small engines and while this does not have a direct bearing on the oil field service, the Wico Electric Co. believes it will prove of interest to exposition visitors.

WAILES, DOVE-HERMISTON CORP.
83 and 128 Texas Building

The Wailes, Dove-Hermiston Corp., is exhibiting Bitumastic enamel for the protection of oil and gas pipe lines. This company's home office is 17 Battery Place, New York City. C. W. Cotton is in charge of the exhibit.

WACKMAN WELDED WARE CO.
40 Refiners and Marketers Building

The Wackman Welded Ware Co., St. Louis, Mo., is showing specimens of its products, which include oil and grease drums, delivery cans, tank wagon buckets and funnels. The company has plants in St. Louis, North Kansas City, Mo.; Houston, Tex., and Sand Springs, Okla. George Wood, of the Sand Springs plant, is in charge of the display.

THE WHITE CO.
Open-air Space

Two truck models particularly adapted to oil field operation are exhibited by the White Co. of Cleveland, Ohio, manufacturer of motor trucks and buses. The six-cylinder White Model 61, equipped with a Braden winch and typical Oklahoma oil field body, is shown as a piece of equipment for the lighter types of service. The heavy-duty field is represented by the six-cylinder, 100-horsepower White Model 59A, equipped with the 2 HC auxiliary transmission, Braden winch, air brakes, and typical Oklahoma oil field body. The White 2 HC auxiliary transmission is also being shown alone.

White company representatives attending the exposition include A. K. Brumbaugh, commercial engineer; G. R. Gwynne and R. W. Knowles, transportation engineers; M. D. Munn, manager technical service; H. L. Rassmussen, Tulsa branch manager; and A. J. Scaife, consulting field engineer.

WATSON-STILLMAN CO.
47 and 48 California Building

The Watson-Stillman Co., New York City, manufacturers of hydraulic machinery, jacks, pipe bending machinery, etc., exhibit a special oil field product for the first time.

WICKWIRE SPENCER SALES CORP.
79 Oklahoma Building

The chief item in the exhibit of the Wickwire Spencer Sales Corp., New York, is a display board showing the different stages in the manufacture of wire used in the construction of wire rope. In addition it has a Neon sign in the back of the booth, 7 feet high and 8 feet 4 inches wide, representing a wire reel.

WIRT FRANKLIN PETROLEUM CORP.
Open-air Space

The Wirt Franklin Petroleum Corp., Ardmore, Okla., is exhibiting a bronze Indian mounted on a 5-foot triangular base and lighted up. This Indian is about 7 feet tall from head to foot and is represented as a "friend." As the story goes, in the early days when an Indian from one tribe was expelled he wandered on the plains until he met another Indian and held up his hand, as the Indian statue does. If the other Indian held up his hand and said "Palacine" the expelled Indian was welcome to join the other's tribe. Palacine is the trade name adopted by the Wirt Franklin organization.

YORK ICE MACHINERY CORP.
60 Refiners and Marketers Building

The exhibit of the York Ice Machinery Corp., York, Pa., consists of a section of a vertical shell and tube ammonia condenser, a section of a forge welded ammonia receiver, samples of forge welded plates and miscellaneous ammonia valves and fittings.

YOUNG ENGINE CORP.
9, 10 Arcade

The Young Engine Corp., Canton, Ohio, is showing the new Young road boring machine, for installing pipes and casings under railroads, paved highways, streets, etc.

W. T. Young, president of the corporation, says: "This machine is built to withstand the hardest usage and with this machine it is possible to install pipes and casings in a comparatively short time and without the trouble and expense of shoring up the railroad tracks or tearing up streets and highways, and therefore pipe lines can be put through quickly and at a small cost. In actual use the machine has installed 8-inch pipes through embankments and fills to a distance of more than 300 feet and has placed various other pipes and casings up to 20 inches diameter."

The road boring machine is fundamentally a horizontal rotary drill, using the pipe or casing that is to be installed and which remains in the ground when the job is completed, as the medium for carrying the rotating cutter head. In operation the machine is placed in the ditch and the power unit is set up on the bank at the side. Flexible and adjustable power takeoffs are designed to meet various operating conditions.

JOHN ZINK CO.
Open-air Space

John Zink Co. of Tulsa, is exhibiting a special burner suited for furnaces where heat is desired without flame or where still gases and rectifying column vapors are used as a fuel.

This burner is especially adapted to refinery tube stills and boilers with limited firing boxes. It will burn the richest of fuel gases without excess air and generate heat without flame. These burners are extremely rugged and are not damaged by heat, slugs of gasoline, oil or water that sometimes blow through them from a fuel line of a refinery or gasoline plant.

This burner is built in two distinct types, one for horizontal firing as in stills and water tube boilers and the other for vertical firing as in oil country boilers.

(Continued on Next Page)

SUPPLEMENTAL LIST OF EXHIBITS

ALUMINUM CO. OF AMERICA
91, 92, 119 and 120 Oklahoma Building

The Aluminum Co. of America exhibits aluminum in semifabricated forms, sheet, castings, Carnegie shapes, strong alloys, roofing, foil, furniture, pipe, nails, bolts, etc. There will also be several pieces of oil field and refinery equipment made of aluminum, which is now in actual service.

Those in attendance are: J. O. Chesley, H. V. Churchill and G. R. Gibbons, Pittsburgh, Pa.; A. B. Williams, St. Louis, Mo.; F. H. Bently and K. V. Alexander, Kansas City, Mo.; R. H. Fulton, Jr., Chicago; S. R. Knapp, New York; F. C. Shoupe, Pittsburgh, Pa.; L. C. Honegger, Houston, Tex.; and E. B. Wilber, Tulsa.

AUSTIN MACHINERY CORP.
Open-Air Space

The Austin Machinery Corp., Muskegon, Mich., exhibits its new model trenching machine.

George Stewart is in attendance.

ARCO CO.
5 Arcade

Arco Co., 7301 Bessemer Avenue, Cleveland, Ohio, manufacturers of a complete line of paint and protective coating for pipe lines, are exhibiting at the exposition.

Frank T. Jamieson, sales manager, assisted by D. S. Pickard, Dallas, Tex., branch manager, and Grover Thompson of Tulsa, will be in attendance.

AMERICAN STEEL WORKS
63 Texas Building

American Steel Works, Twenty-seventh and Southwest Bouvelard, Kansas City, Mo., are exhibiting the American Chief Model "H" tar wagon, equipped with double coilless type oil burner for kerosene and distillate in sizes from 250 to 1,000 gallons. They also will have on exhibit Model "T" heater, equipped with 6-inch steel face roller bearing wheels, with snaking skid and shields, sizes 60, 110 to 165 gallons. The American coiless torch is made in single, double or triple, for bending pipe on the job.

R. M. Soper of the Kansas City, Mo., office is in attendance.

BUCKEYE IRON & BRASS WORKS
22 California Building

The Buckeye Iron & Brass Works, Dayton, Ohio, exhibits a line of filling station equipment.

BARNSDALL CORP.
45 by 50, Lot "O"

Barnsdall Corp., Petroleum Building, Tulsa, is exhibiting a model of the world's first oil refinery. The exhibit is in charge of Edwin I. Reeser.

BAUSCH & LOMB OPTICAL CO.
Booth 3, Scientific & Technical Building

The Bausch & Lomb Optical Co., 635 St. Paul St., Rochester, N. Y., manufacturers of orthogon eyeglass lenses for better vision, is showing the Bausch & Lomb Abbe refractometer, by which the strength and purity of solutions can be determined as well as the proportion of mixture of two liquids, the percentage of foreign matter in a substance and other valuable factors. E. A. Rogers is in attendance.

BULLARD DAVIS, INC., OF DELAWARE
87 Texas Building

The Bullard Davis, Inc., 67 Wall Street, New York City, is exhibiting a complete line of safety equipment for the petroleum industry. Chief among the articles displayed is the new U.C.C. combustible gas indicator. This indicator is demonstrated to show its accuracy and dependability in detecting explosive, gaseous mixtures.

The display also includes the Eveready improved safety flashlight, the B.-D. inhalator, a complete line of B.-D. unit type first-aid kits, gas masks and Willson goggles. The booth is in charge of B. F. McDonald, sales manager of the company, and J. J. Delahide, district representative.

BLACK, SIVALLS & BRYSON, INC. AND AMERICAN TANK & EQUIPMENT CORP.
10, 11 California Building and Block B, Open-air Space

Black, Sivalls & Bryson, Inc., Bartlesville, Okla., and American Tank & Equipment Corp., Oklahoma City, are exhibiting B.S.&B. perfection vapor pressure bolted steel tanks, B.S.&B. A.P.I. bolted steel tanks, improved American oil and gas separators, B.S.&B. safety walkway and stairway and miscellaneous refinery and gasoline equipment. The display may be seen in Booths 10 and 11 California Building and at the southeast corner of Block B.

BEALL CONSTRUCTION CO.
10 by 15, Lot R

The Beall Construction Co., 304 Public Service Building, Tulsa, has on exhibition a model of furnace wall construction as installed by several of the Mid-Continent refining companies. Lee M. Beall is in attendance.

BRADEN STEEL & WINCH CO.
Lot H, Open-air Space

Braden Steel & Winch Co., Tulsa, Okla., is exhibiting its "Big Bertha" oil field winch in space "H." This machine is designed especially for rod and tube pulling on deep wells. It is powered by the 15-30 McCormick-Deering tractor engine and by means of a patented countershaft arrangement. There are available six pulling speeds from 60 to 634 feet per minute.

The use of heavy tractor equipment permits of the removal of expensive individual units and resultant high maintenance. The Big Bertha winch unit is applied particularly to the 15-30 McCormick-Deering power, and also to the Monarch "50" Crawler tractor. The Big Bertha drum assembly is also being applied to heavy duty truck units employing the truck engine for winch power.

The Braden Steel & Winch Co. also has on exhibit its complete line of all-steel irreversible horizontal truck winches. In addition to the regular line, the new Model 41 is announced. The Model 41 is equipped with the exclusive Braden automatic safety brake which prevents the drum from rotating backwards when under load. With the Braden horizontal winch equipped with the automatic safety brake, the load must be lowered by engine power. The most important steel parts in Braden winches are guaranteed against breakage or bending for the full period of their installation upon the truck on which they were originally mounted.

CHICAGO PNEUMATIC TOOL CO. (OIL TOOL DIVISION)
71 Texas Building

The Chicago Pneumatic Tool Co., 63 Forty-fourth St., New York City, exhibits the CP Tucone rock bit with three separate reamer cutters placed at the proper distance for best alignment and efficient reaming. Mr. Downey of the Oklahoma City office will be in attendance.

CRANE CO.
Open-Air Exhibit

Crane Co. displays its complete line of valves and fittings to satisfy the needs of all divisions of the oil and gas industry, and among these are its new type steel drilling-through and flow line valves for all pressures. This product is of recent development.

Another new product displayed is the electric welded forged steel fitting for use with pipe for threading ends, beveled ends for welding, or recessed for clamp type couplings.

Manufacturing schedules for this product have just been completed, have not yet been available for wide distribution to the user, and should prove highly interesting.

Crane Co. is represented by Oscar Bloomhagen of the Chicago office; Howard Pape, Mid-Continent representative; F. A. Malatesta, manager Tulsa branch; N. E. Bleuler, assistant manager Tulsa branch; T. S. Jones, Tulsa sales repre-

Billions of Bubbles

Get That Temperature Down

HUMAN life represents a delicate balance between temperatures. A few degrees one way or the other, and there would be no human beings on this earth. But, thanks to his body's multicellular cooling system, man leads a quite comfortable existence.

In a gasoline plant, too, temperature plays an all-important role. Since maximum absorption depends on low temperatures, the type of cooling apparatus selected should be given the most careful consideration.

Campbell COOL-R-UNITS, the product of much research and expermentation, are likewise multi-cellular . . . can be installed as needed, cut in or cut out as conditions demand.

COOL-R-UNITS are welded construction, tested to a working pressure of 600 pounds . . . interchangeable, easily transported. Standard units are carried in stock, ready to be installed on a few hours' notice.

COOL-R-UNITS are fully described in Bulletin No. 7. Ask for your copy today.

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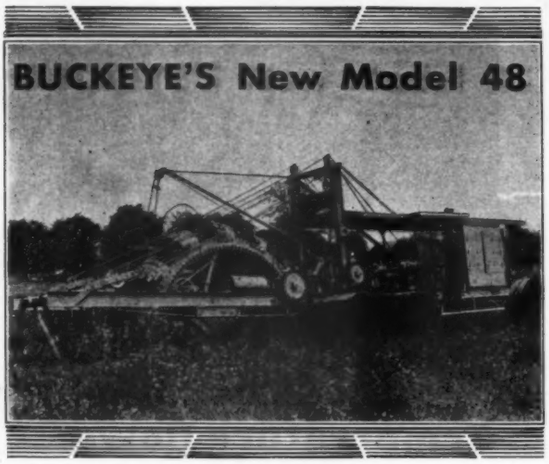
STEARNS-ROGER MFG. CO., DENVER
MID-CONTINENT AGENCY

Originators of Oil-Froth Absorbers

See Buckeye Model 12 in BLOCK "H" at the INTERNATIONAL PETROLEUM EXPOSITION, Tulsa, October 4 to 11



A BIG-POWERFUL-SPEEDY PIPE LINER

Cutting Widths: 22" and 24"—26" and 30"—37" and 40". Cutting Depths: 6½', 7½' and 8½'

Heavy duty, large cutting capacity and speed aplenty characterize Buckeye's newest Pipe Liner—Model 48. It will cut the biggest pipe line trenches most successfully and economically, through the toughest soils and in all kinds of weather.

That ability is assured by the fact that it is designed and built directly to the specifications of the world's foremost pipe line engineers and contractors. The leader in its field is mighty Model 48—just another addition to the comprehensive range of *Wheel-Type* Buckeyes—"*the* ditchers that meet *all* oil and gas field requirements."

Ruggedness is supplemented with remarkably easy (one-man) control. All favorite old operating features are retained, with many equally advantageous new ones. Profitable construction details include: Sturdy main frame—and no Buckeye main frame has ever broken; 95 h.p., 4-cylinder, industrial-type, medium-speed motor, which delivers plenty of power for ordinary needs, *plus* an ample reserve for all emergencies; the famous Buckeye digging wheel; multiple, quickly-shifted digging speeds, ranging from 15" to 134" per minute; accurate grading ability, producing a cleanly finished trench at one cut; and Alligator *(crawler)* wheels, with traction brakes for safe operation on grades.

Our new Catalog, "BUCKEYE—*The Pipe Liner*", contains vitally interesting specification, mechanical and performance data for all prospective pipe line ditcher owners and users. May we send you a copy?

THE BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO

There's a Buckeye Sales and Service Office near You

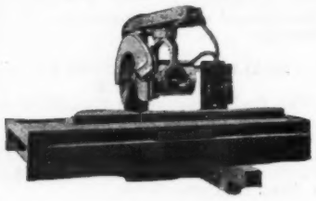
for over thirty years Buckeye

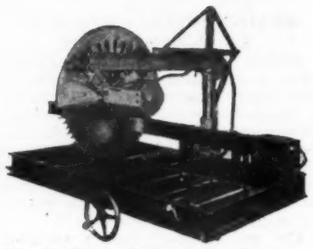
sentative; H. W. Goodman, Tulsa sales representative; C. L. Legg, manager Oklahoma City branch; L. Bendia, Oklahoma City sales representative.

CALORIZING CO.
57 and 58 California Building

The Calorizing Co., Pittsburgh Pa., is exhibiting Calite-B castings for supporting calorized tubes as well as the tubes themselves which are specially prepared to meet refining conditions in cracking stills. B. F. Sayles, manager of oil field sales, is in attendance.

DE WALT PRODUCTS CO.
Lot F, Open-Air Space





The De Walt Products Co., Lancaster, Pa., manufacturer of wood working and metal cutting machinery is exhibiting its latest model at the Oil Show for the first time.

JOSEPH DIXON CRUCIBLE CO.
97 Oklahoma Building

Joseph Dixon Crucible Co., Jersey City, N. J., are showing Dixon graphite seal, a new Dixon product for sealing screw thread, flange and gasket joints. B. H. Rowley is in attendance.

ELECTRIC CONTROLLER & MFG. CO.
55 California Building

The Electric Controller & Manufacturing Co., Cleveland, Ohio, will exhibit its oil immersed automatic motor starters and controlling device that has been worked out in connection with the automatic pipe line pumping station which will also be demonstrated at the exposition. Mr. Williamson of Petroleum Electric Co., Tulsa, will be in attendance.

FORT WORTH WELL MACHINERY & SUPPLY CO.
Open-Air Space

The Fort Worth Well Machinery & Supply Co., of Fort Worth, Tex., is exhibiting one of its caterpillar type Super "H" Fort Worth spudders and the latest development in its line of drilling rigs; the new Super "J," embodying features, which, the makers say, were never before shown on portable drilling equipment, one of the foremost of these being the chain driven sand reel. This sand reel is operated by a Herdman Fort Worth spudder clutch, and spools more than 8,000 feet of nine-sixteenth inch sand reel. Steel pitmans and a shock absorber each with special features are added parts in the new machine.

The caterpillar crawler feature of the Super "H" model is said to make possible the transportation of this machine over soft and sandy earth with the least possible horsepower. W. B. Brown is in charge.

GOSLIN-BIRMINGHAM MANUFACTURING CO.
54 California Building

The Goslin-Birmingham Manufacturing Co., Birmingham, Ala., exhibits the Vallez rotary leaf filter for contacting and dewaxing oil.

GLOBE MACHINERY & SUPPLY CO.
Open-Air Space

The Globe Machinery & Supply Co., Des Moines, Iowa, is showing the Globe auto hoist, a device for use at service stations where the car is to be elevated to enable easy access for lubricating purposes.

HAYNES STELLITE CO.
16, 17 Texas Building

The Haynes Stellite Co., pioneer manufacturers of hard facing and hard setting products, will demonstrate the use of Haynes Stellite and Haystellite on drilling and coring tools.

A new product, "Composite Rod," to be shown this year, consists of a solid rod of Haynes Stellite impregnated with Haystellite, combining the abrasive resisting properties of these two alloys.

A series of corrosion resistant alloys called "Hastelloy" will be exhibited for the first time. Hastelloy A, C and D resist hydrochloric, nitric and sulphuric acids, respectively, while being resistant also to attack by alkalies, organic acids and other corrosive agents.

IMPERIAL BRASS MANUFACTURING CO.
60 California Building

Imperial Brass Manufacturing Co., 1200 West Harrison Street, Chicago, exhibits its complete line of welding equipment, including torches and generators.

J. KAMMERDINER
30 Oklahoma Building

J. Kammerdiner, 237 Highland Avenue, Los Angeles Calif., exhibits his improved rotary jars. J. A. Kammerdiner is in charge.

KEY BOILER EQUIPMENT CO.
1 and 2, Refiners & Marketers Building

Key Boiler Equipment Co., Twenty-seventh and McCasland, East St. Louis, Ill., is showing a new type of return bend which has been developed by this company, and is being demonstrated by Fred Key. The new fitting is designed for all forms of tube assembly, especially where ni-chrome tubes are in use.

In addition to the safety and time saving features of this fitting, the manufacturers assert it is the most economical type of return bend for use with chrome nickel tubing.

KEROTEST MANUFACTURING CO.
67 Texas Building

The Kerotest Manufacturing Co., 2525 Liberty Avenue, Pittsburgh, Pa., displays its newly developed products of the past year. Drilling valves, flow line valves and Christmas tree fittings of 6,000-pound test are shown along with the newly designed cast steel high pressure throttle valve for use on steam engines for rotary or cable tool drilling. There also is a new type of high pressure oil saver for drilling in or finishing wells with cable tools. The exhibit is in charge of W. G. Swaney, general manager, and Shep F. Miers, Mid-Continent representative.

LARKIN PACKER CO.
99 Oklahoma Building

The Larkin Packer Co., 6200 Maple St., St. Louis, Mo., exhibits the complete line of equipment manufactured by this company, including aluminum reenforced concrete float collar and the aluminum shoe with concrete guide. Additional lines exhibited are the combination float shoes with aluminum valves and guides, float collars with aluminum valves re-enforced with concrete, aluminum re-enforced concrete float shoes, drill pipe floats and cement dump bailers. John Larkin is in attendance.

LION BROTHERS CO., INC.
23 Refiners and Marketers Building

Lion Brothers Co., Inc., Baltimore, Md., is exhibiting for the first time at the Petroleum Exposition and has a very interesting display which will be of interest to the industry.

MASON REGULATOR CO.
23 Oklahoma Building

Mason Regulator Co., Boston, Mass., exhibits regulators having various uses in the oil industry, including reducing valves, steam vacuum pump regulators, steam pump pressure regulators, excess

(Continued on Page 432)

CALIFORNIA OIL FIELD OPERATIONS FOR AUGUST

According to figures collected by the American Petroleum Institute, Pacific Coast office, the total production of crude oil in California for August amounted to 18,770,466 bbls., an average of 605,499 bbls. per day. This is a decrease of 1,018 bbls. per day under July production.

Total stocks of crude and all products in Pacific Coast territory decreased during the month 1,032,155 bbls. The total stocks at the end of the month were 181,223,790 bbls. The total stock decrease for 1930, up to August 31, was 3,539,943 bbls.

Fifty-nine wells were completed during the month with an initial daily production of 53,064 bbls., compared with 47 wells completed during July with an initial production of 33,586 bbls.

PRODUCTION

(Figures of production and stocks are in barrels of 42 gallons)

District—	Bbls. per month	Daily average Aug., 1930	July, 1930	Aug., 1929
Kern River	415,709	13,410	13,934	15,338
Mount Poso	326,940	10,546	10,932	5,276
Fruitvale	70,372	2,270	2,443	1,948
Round Mountain	121,151	3,908	3,750	730
McKittrick	124,539	4,017	3,737	4,650
Midway-Sunset	1,948,348	62,850	63,983	66,436
Elk Hills	559,811	18,058	17,958	17,436
Lost Hills-Belridge	70,009	2,258	2,203	4,070
Coalinga	287,180	9,264	9,241	10,014
Kettleman Hills	415,815	13,413	13,467	4,042
Wheeler Ridge	17,900	578	581	650
Watsonville	1,937	62	62	62
Santa Maria	112,440	3,627	3,585	4,286
Capitan	1,894	61	15	.....
Summerland	8,852	286	359	385
Elwood	1,328,170	42,844	44,501	21,723
Santa Barbara	.....	.....	.....	27
Rincon	75,771	2,444	2,482	3,140
Ventura Avenue	1,472,814	47,510	49,211	62,040
Ventura-Newhall	140,895	4,545	4,714	4,906
Los Angeles-Salt Lake	48,168	1,554	1,505	1,557
Whittier	44,413	1,433	1,408	1,562
Fullerton (Brea Olinda)	360,824	11,640	11,915	12,386
Coyote	339,745	10,960	9,942	11,409
Santa Fe Springs	3,375,833	108,898	112,182	281,501
Montebello	222,252	7,169	7,296	9,822
Richland	282,264	9,105	8,824	15,209
Huntington Beach	904,584	29,180	28,844	43,654
Long Beach	3,202,762	103,315	100,137	175,044
Torrance	344,757	11,121	11,658	13,349
Dominguez	310,757	10,024	10,306	9,390
Rosecrans	216,643	6,989	6,780	6,979
Inglewood	540,958	17,450	17,311	23,522
Newport	1,240	40	40	40
Seal Beach	621,578	20,051	20,908	43,876
Potrero	61,586	1,987	1,859	624
Lawndale	9,227	298	266	1,411
Playa Del Rey	382,328	12,333	8,177	.....
Total	18,770,466	605,499	606,517	878,495
July	18,802,024	606,517	.....	.....
Decrease	31,558	1,018	.....	.....

STOCKS

	Aug. 31, 1930	July 31, 1930	Aug. stock decrease	Aug. 31, 1929
Heavy crude, heavier than 20° A.P.I., including all grades fuel	111,431,519	112,250,064	818,545	109,213,315
Refinable crude, 20° A.P.I., and lighter	41,702,823	41,831,069	128,246	37,776,164
Gasoline	16,259,805	16,443,513	183,708	14,990,912
Naphtha distillates	3,327,127	3,518,175	191,048	2,877,322
All other stocks	8,502,516	8,213,124	*289,392	10,193,955
Total all stocks	181,223,790	182,255,945	1,032,155	175,051,668

*Increase.

DEVELOPMENT

District—	New rigs up	Active drilling	Completed	Daily initial output	Active producing	Abd. wells Drillers	Abd. wells Producers
Kern River	..	3	..	.....	917	..	..
Mount Poso	3	..	1	175	70	..	..
Fruitvale	..	1	..	.....	17	..	..
Round Mountain	3	5	6	1,490	28	..	..
McKittrick	..	..	..	.....	247	..	..
Midway-Sunset	4	13	5	944	1,906	1	8
Elk Hills	..	..	1	400	241	..	..
Lost Hills-Belridge	..	2	..	.....	161	..	..
Coalinga	..	1	..	.....	731	..	..
Kettleman Hills	2	8	1	2,845	7	..	..
Buttonwillow gas field	..	1	..	.....	7	..	..
Wheeler Ridge	..	..	..	.....	33	..	..
Watsonville	..	..	..	.....	6	..	..
Santa Maria	1	2	..	.....	187	..	..
Capitan	1	1	1	210	1	..	..
Summerland	..	..	..	.....	97	..	..
Elwood	2	6	4	15,800	45	..	..
Santa Barbara	..	2	..	.....	.....	..	..
Rincon	..	3	..	.....	32	..	..
Ventura Avenue	5	21	3	5,500	150	1	..
Ventura-Newhall	3	14	1	175	416	1	..
Los Angeles-Salt Lake	..	..	..	.....	298	..	1
Whittier	..	1	..	.....	161	..	..
Fullerton	..	1	..	.....	366	..	..
Coyote	..	3	1	550	198	..	..
Santa Fe Springs	..	4	2	365	465	..	..
Montebello	1	1	..	.....	165	..	..
Richland	..	..	3	490	175	..	..
Huntington Beach	2	4	..	.....	401	..	..
Long Beach	21	63	15	10,780	865	..	..
Torrance	..	..	..	.....	535	..	3
Dominguez	..	2	..	.....	63	..	1
Rosecrans	..	3	1	1,225	106	..	2
Inglewood	2	1	..	.....	218	..	..
Newport	..	..	..	.....	4	..	..
Seal Beach	..	3	..	.....	133	..	..
Potrero	..	11	3	1,190	15	..	..
Lawndale	..	..	..	.....	8	..	..
Playa Del Rey	53	60	11	10,925	24	..	..
Miscellaneous drilling	13	175	..	.....	.....	19	..
August	115	423	59	53,064	9,497	22	15
July	93	435	47	33,586	9,440	14	54
Increase	22	*2	12	19,478	57	8	*39
Average for year 1929	109	510	76	100,625	10,550	26	18
Average for year 1928	107	520	59	56,802	10,823	15	25
Average for year 1927	97	404	75	39,992	11,276	23	21
Average for year 1926	95	423	76	32,635	11,288	24	17
Average for year 1925	105	417	79	42,247	11,393	28	12

*Decrease.

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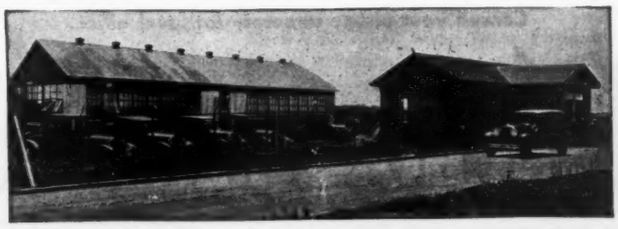

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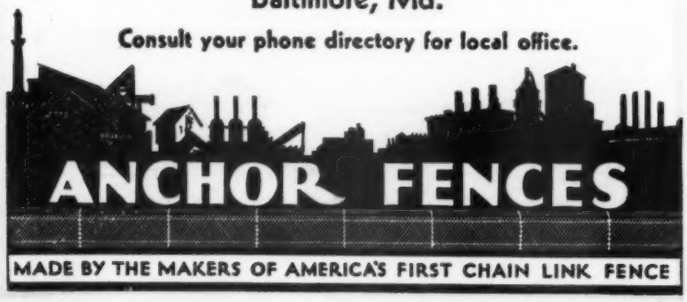

MADE BY THE MAKERS OF AMERICA'S FIRST CHAIN LINK FENCE

PROPER LUBRICATION FOR DIFFERENT GAS ENGINES

(Continued from Page 171)

upon the nature of the oil in use. Even when a good quality oil is used the oil feeds should be reduced to the exact amount required for full and efficient lubrication. This will lead to cleaner lubrication as there is not an excess of oil to be burned and the impurities find less oil to which they can adhere.

Deposits caused by over feeding of oil accumulate behind the piston rings often cementing the rings in their grooves so that they cease to function as a ring. Heavy wear takes place, the oil film is burned away, the burning gases pass the piston and in the case of double acting engines pass from one side of the pistons to the other igniting the fuel charge on the opposite side and causing preignition. Increased oil feed will only aggravate the trouble.

Frequently the stuffing boxes in large gas engines are over lubricated with the result that carbon deposits are formed, causing the packing rings to stick in their grooves. Wear follows and the gases blow past the rings.

Cause of Deposits

Deposits may be formed by any one of the following causes: dust or dirt in the intake air, incomplete combustion, impurities in the gas, unsuitable oil, as well as the over feeding of oil.

Intake air is usually not filtered, even when the engines are placed in dirty surroundings, and is frequently the cause of deposits in gas engines. Incomplete combustion will cause sooty crumbly deposits and is often caused by poor ignition or improper timing of the valves.

Impurities in the gas when natural gas is used is usually caused by dirt in the pipes and the rusting of the inside of the gas lines. Unsuitable oil may mean an oil that will not stand up under the temperatures encountered on the cylinder walls, or an oil that will not properly distribute itself over the piston due to too high a viscosity.

Deposits may form on the mixing and inlet valves, in the cylinders, on the pistons, behind and between the rings, on the exhaust valves and in the stuffing boxes.

In small gas engines, the frictional losses average from 15 to 30 per cent of the rated horsepower, while in the larger sizes the frictional losses average from 10 to 20 per cent of the rated horsepower. This loss is constant and independent of the actual engine load. While frictional losses in vertical gas engines is usually less than in the horizontal gas engine.

The use of an unsuitable oil will often result in a further loss of 5 to 10 per cent in unnecessary friction, even though the engine appears to be operating satisfactorily. It is important that the oil shall have a suitable viscosity for the particular engine on which it is to be used.

Too heavy an oil does not spread over the piston surface and causes an increase in friction due to the heavy oil drag on the piston. Impurities in gas and air cling to the heavy oil and bake into crust like deposits.

Too light an oil breaks down under the heat in the cylinder loosing its sealing power, causing excessive friction and wear. Carbonaceous deposits caused from too light an oil will be found to contain considerable iron oxides due to the wear on the piston and cylinders.

The lubrication of the bearings usually gives no trouble and usually the oil that is used on the piston gives good service on the bearings. Occasionally, however, it is advisable to use the two oils. This of course depends on the size of engine, the operation, the bearing pressure and method of applying the oil.

On ring oiled bearings only sufficient oil should be added to maintain the proper level in the reservoir. The reservoirs should be emptied, cleaned and refilled at intervals from three to six months depending upon the dirt in the engine room.

The wrist pin requires care in lubrication, as on some engines it is located in the interior of the heated hollow trunk piston where it is subjected to high temperatures. The pressures on the wrist pin are high and as the oscillating motion of the connecting rod is slight, the oil spreads with difficulty over the bearings surfaces. Consequently the lasting and lubricating properties of the oil used are very important.

Waste Oil

The waste oil coming from the piston and wrist pin in small and medium sized engines should not be allowed to drain into the crank pit and contaminate the oil coming from the crank pin.

Vertical gas engines usually operate at high speeds. It is important that the correct oil be used in the crank chamber. The oil should give continued perfect service notwithstanding the severe conditions of speed and temperature to which it is exposed.

Consideration must be given to the temperature of the oil in circulation for with a high oil temperature it is necessary to use an oil heavy in body.

It must be kept in mind that the lubrication requirements of the cylinders of a vertical gas engine are different from the lubrication requirements of the external moving parts enclosed in the crankcase. When lubricated by the splash or pump circulating system the oil must meet the requirements of both. But when the engine is constructed with a distance piece between the cylinders and crank chamber the lubrication of the cylinders and bearings may preferably be carried out by means of two oils using two separate and distinct systems such as force feed lubricator for cylinders and splash or force feed lubricators for bearings.

Selecting Grade of Oil

In selecting the correct grade of oil to properly lubricate an engine it is necessary to consider the various influencing factors such as piston clearance, number of piston rings, whether the piston is supported by external means or whether the weight of the piston is sliding on the cylinder, the temperature of the water leaving the cooling jacket, the method of lubrication, also whether there are any mechanical or operating conditions which call for special consideration.

The Saybolt viscosity at 100° F. is usually used in indicating the correct grade of lubricant. When the gas engines are in good mechanical condition the small four stroke cycle gas engines up to 50 horsepower per cylinder require an oil with a viscosity between 180 and 300, the medium size four stroke cycle gas engines between 80 and 150 horsepower per cylinder and small vertical engines require an oil with a viscosity of 300 to 400, while for external lubrication an oil with a viscosity of 180 to 400 is satisfactory. Large horizontal and vertical four stroke cycle engines, all sizes of two stroke cycle engines and small four stroke cycle engines with insufficient cooling systems require oils as high as 650 viscosity.

Some engine manufacturers furnish specifications for the oils to be used on the engines, others recommend some well known oil or its equivalent, others depend on the recommendations of the oil companies.

Quantity of Oil

In regard to the quantity of oil required to properly lubricate a gas engine it has been found that gas engines up to 50 horsepower require from 1¼ to 3⅛ pints of oil per eight hours continuous operation.

For large gas engines the oil consumption ranges from four-fifths to 2½ pints per 100 horsepower per eight hours. This consumption is divided among cylinders and pistons, rod packing and bearings approximately in the ratios of 35, 15 and 50 per cent, respectively; the average will be about 1¼ pints per 100 horsepower per eight hours continuous service.

Tests have shown there are approximately 20,350 drops in a pint of gas engine oil. Based on this if a force feed lubricator is furnishing oil to the engine at the rate of 85 drops per minute the consumption will amount to 1 quart in eight hours.

This can be used as a rough estimate in determining the consumption of a gas engine equipped with force feed lubricator.

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(*Agglutinant*) (*Precipitating and Waterproofing Compound*)

THROUGHOUT the oil world reports of the powerful, positive qualities of FISSURSEAL in recovering lost circulation, walling up sand and shale, cavey formations and effecting cementations in shifty sands and other supposedly impossible conditions, are told by veteran oil men who have a reputation for being right! The most recent instance is that of the Signal Oil Co. at Signal Hill, Calif., but there are many others that will gladly be cited upon request.

Week by week the testimony continues to pile up that there is nothing to compare with the prompt, certain results of FISSURSEAL in cementing and reconditioning wells, filling fissures in mines, or on construction projects where a fiberized method is needed in the mud or cement alone or with a precipitation of chemicals in the mix. A powerful . . . congealing . . . expanding . . . combination that is added to the mud. Consists of the three famous Sulco solutions shown below, mixed in the order named:

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2. FIBERMIX

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3. SLUSHMIX

LIQUID. The improved lubricator-sealer and mud heavier. Acts as binder. Soluble in water. Carries cuttings to the surface.

Other Sulco "Trail Blazers"

Depend upon SULCO Chemists to meet every technical need in oilfield operations with an improved product and when necessary, with special formulas to solve an oilfield operator's special problems. SULCO Products time and again have pioneered in products that overcome the diverse difficulties encountered in the oilfields of the world. It has become almost a habit with many operators to say, "when others won't—Sulco will". The choice of SULCO Products is ever growing in volume. 50 carloads of mud lubricant were shipped to one customer. Other SULCO favorites include:

Kleen-A-Well (cleans tubing and rods); Solrite (boiler compound); Deflect-O-Lite (aluminum paint for steel tanks, etc.); International Blue Paint; Graphite Boiler & Stack Paint; Sulco Powder Paint (mixed with water, works and looks like an oil paint—all colors); Sulco Insulating Cement; Flameproofing (preservative for oilfield timbers).

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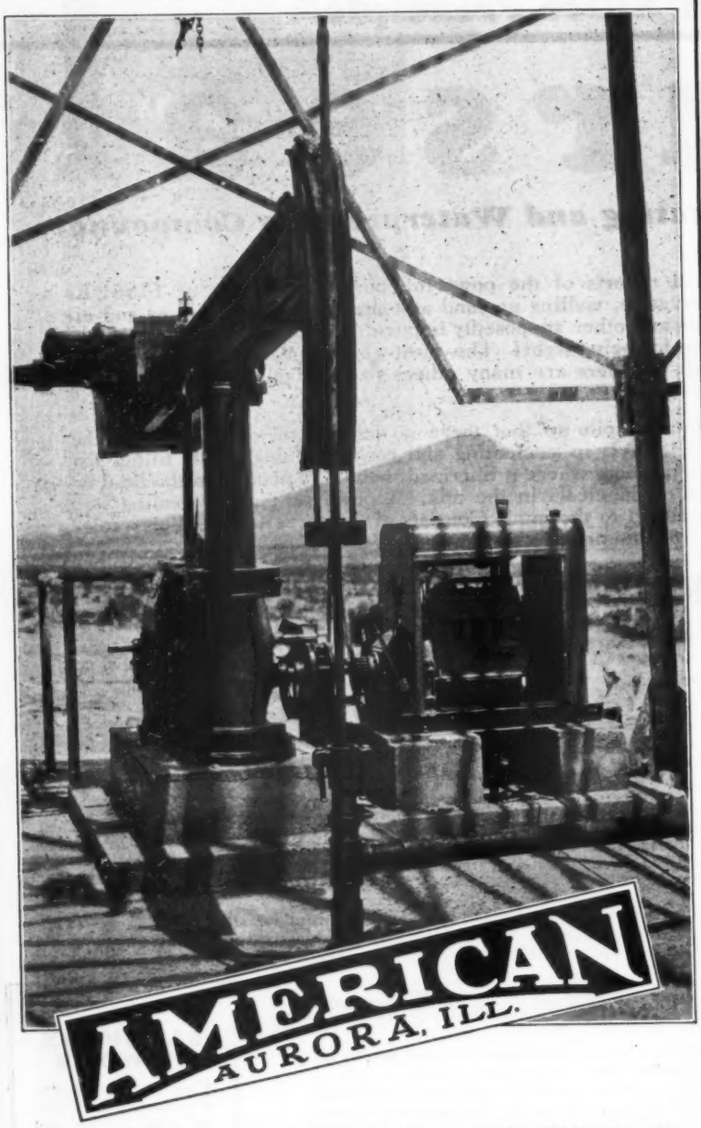
AN "AMERICAN" WITH GAS ENGINE



PICTURED is an "American" No. 4-A Fig. 1822 oil well pumping unit direct connected to a gasoline engine. "American" units have been particularly designed to meet the various drive requirements of different localities. "American" units are adaptable for pulley, V-belt or direct drive by gasoline engine or electric motor.

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ECONOMIC COMPARISON OF MEXICAN FIELD

(Continued from Page 167)

continued in boom proportions from 1920 until the first part of 1923. Prior to the commencement of the boom, most of the larger companies had succeeded in getting control of large blocks of land along the structure either through purchase or lease. However, the portions of the area, such as Amatlan, Chinampa and Zacamixtle, that were subdivided into small lots furnished an opportunity to many independent operators to obtain an interest in the field. This gave rise to diversified ownerships of small tracts and resulted in highly competitive drilling and development during and after the boom period.

Boom Period

The boom period in Mexico was one of the most unusual in the history of petroleum development. The high degree of competition, the ever-increasing demand for the oil, and the semilawless condition of the country, together with difficult working conditions, made the cost of development extremely high. Contracts for wells, which under normal conditions would cost from $18,000 to $24,000, ran from $75,000 to $100,000 each; and the costs of installations, such as pipe lines, pump stations and camps were proportionally high. Companies that operated their own tools were able to drill wells somewhat more cheaply than the companies that dealt with contractors; but wages, material and transportation costs were so high than even these wells averaged in the neighborhood of $65,000 each during the boom time. In comparison with present-day costs, these figures appear incredible. The only explanation is that the price of the oil and the scarcity of skilled labor, together with difficult working conditions, made it possible for contractors and individuals to demand almost any price for their services.

Comparison of Costs

A comparison of development costs of properties in which small lots are owned by many individuals and companies with the development costs of larger tracts owned and operated by one company furnishes a striking illustration of the economic waste that accompanies competitive development. For the purpose of comparison, two blocks of land of equal area, located on the Golden Lane, have been selected. One of these is in the highly competitive area in Amatlan and Zacamixtle and extends from Lot 148, Amatlan, to the northern Toteco boundary. This competitive block is owned and operated by 32 individuals and companies. The other block, which is owned and operated by one company, is in Tierra Blanca and Chapapote, and extends from the northern Tierra Blanca boundary to the Tuxpam River. Both blocks include the entire producing width of the Golden Lane. They are similar both as to structure and producing conditions, and therefore furnish a fair basis for comparison.

Production from the structure is controlled by hydrostatic pressure, which causes the wells to flow from the time of their completion until the accessible oil has been drained and the wells invaded by salt water. It becomes necessary from time to time during the life of a well to partly close in the production so as to prevent the coming of salt water in the reservoir and the resulting invasion in the well. The reservoir is undoubtedly formed by an intricate network of fissures and caverns in the crystalline, fossiliferous El Abra limestone. A consideration of this feature is necessary in making a comparison of two separate areas on the structure, for the reason that porosity varies considerably in different regions. For instance, were a comparison made between Amatlan-Zacamixtle and Cerro Azul, where one well, No. 4 Cerro Azul, has produced more than the entire Amatlan-Zacamixtle area, the results would not show a true relationship. The two areas to be compared were selected not only because they illustrate competitive and noncompetitive development, but also because producing conditions have proved to be very similar. The average estimated initial production per well in the competitive block amounts to 17,500 bbls. daily, while that in the noncompetitive block amounts to 19,500 bbls. The small difference can be accounted for by the fact that many of the wells in Amatlan and Zacamixtle were not favorably located as to structure and therefore were completed as small wells.

Production Compared

The total production from the competitive block to January 1, 1930, was 89,676,846 bbls., which gives an average of 427,032 bbls. per well drilled, or an average of 786,639 bbls. per producing well. Prior to January 1, 1930, the noncompetitive block produced 71,659,345 bbls., which gives an average of 796,215 bbls. per well drilled or 1,214,565 bbls. per producing well. This shows that the average production per well from the competitive block was just a little more than one-half of the average per well from the noncompetitive block.

The present daily potential from the competitive block is 6,200 bbls., as compared to a potential of 19,670 bbls. from the noncompetitive block. It is estimated that a future reserve of 4,000,000 bbls. remains to be produced from the competitive block, and that a minimum of 9,000,000 bbls. remains to be produced from the present wells in the noncompetitive block. It is considered that the competitive block is completely drilled up, while at least 15 locations remain to be drilled on the noncompetitive block. Ten of these 15 wells should be producers and it is estimated that they will produce an average of 500,000 bbls. each, giving a total undrilled reserve of 5,000,000 bbls. On this basis, the total ultimate recovery from the competitive block will be 93,676,846 bbls., or an average of 446,366 bbls. per well drilled, as compared to a total ultimate recovery of 85,659,345 bbls., or an average of 815,803 bbls. per well drilled, from the noncompetitive block.

Drilling Costs

In all, 214 wells have been drilled in the competitive block, which amounts to one well for every 16.9 acres. Of this number, 175 wells were drilled during the boom period and 39 have been drilled under normal conditions since its close; 117 wells, or 55 per cent, were completed as producers, giving an average of one producing well for every 30.3 acres. Based on a conservative estimate, the 175 wells drilled during the boom period cost $75,000 each, or a total of $13,125,000. The 39 wells drilled since the close of the boom were drilled at an estimated average cost of $25,000 each, or a total of $975,000. To this must be added the cost of plugging 117 producing wells at an average of $3,000 each, or $351,000. The estimated cost of drilling and plugging 214 wells, therefore, totals $14,451,000.

In the noncompetitive block, 90 wells have been drilled, or one well to every 32 acres; 26 were drilled during the boom period and 64 thereafter. Of these wells, 59, or 66 per cent, were completed as producers, giving one producing well for every 60 acres. The wells drilled during the boom, having been drilled by company tools, averaged $65,000 each in cost, making a total of $1,690,000 for the 26 wells. The wells drilled after the boom have cost an average of $25,000 each, or $1,600,000 for 64 wells. It is estimated that an additional 15 wells will be necessary to completely develop this block. These should be drilled at a cost of $20,000 each, or a total of $300,000. Of these additional wells, 10 should be producers, which, together with 59 present producers, will give a total of 69 producing wells on the block. The cost of plugging these 69 producers, at $3,000 each, will be $207,000. The total cost of drilling and plugging in the noncompetitive block, therefore, will be $3,797,000, as compared to $14,451,000 in the competitive block.

Physical Installations

As numerous physical installations of which no records were kept were made in the Amatlan-Zacamixtle block during the boom period, it is impossible to obtain an accurate total of the cost of pipe lines, tanks, pump stations and buildings. The general lack of organization caused by existing conditions led to unnecessary

Why Corrosion is a Negligible Factor in the Performance of the Ljungstrom Preheater » » » » » » » »

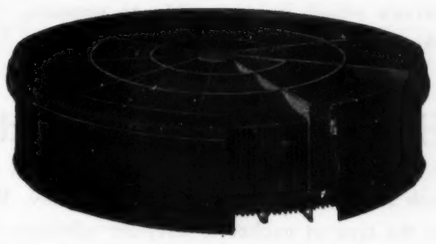
CORROSION of Ljungstrom regenerative heating elements *to paper thinness* neither causes derangement nor impairs heat transmission. The only effect is to reduce the storage capacity of the heating elements through reduction of their mass of metal. The Ljungstrom Preheater is so conservatively rated that considerable of the heating metal could be eaten away before the temperature of the furnace air supply would drop enough to noticeably affect the boiler performance.

To begin with, corrosion is not apt to occur. Even though condensation took place on the cold ends of the heating elements while they are in contact with the flue gas, the moisture would be completely evaporated the next moment, when clean dry air passes through the same channels.

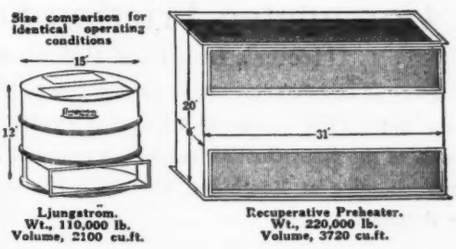
Corrosion if it develops, is almost invariably confined to the cold ends, and before metal renewal can become necessary, the corroded old heating elements may be reversed in their setting to bring the remaining good metal to the field of greatest service. This procedure involves little labor, restores most of the original heat transfer efficiency and almost doubles the life of the elements.

If renewal ever does become necessary, all heating surface can be renewed at an expense which including labor, does not exceed 15 per cent of initial preheater cost.

Contrast this simplicity, efficiency and low maintenance cost with the conditions in a recuperative (plate type) preheater, where the same surface remains always in contact with either the air or the flue gas, and where the moisture cannot evaporate during entire periods while the metal has a temperature lower than the dew point of the flue gas. On account of the difficulty in obtaining perfect circulation in a recuperative preheater, dead pockets in the heating surface are apt to be cooled down to a temperature much below the mean between the cold air and the cooled gas. This condition hastens corrosion, the plates become perforated, and leaks start, after which early renewal and replacement of the defective plates is urgent to avoid short circuiting of air into the flue gas. Then riveted, welded or expanded joints must be broken, and larger heavy fabricated metal chambers representing 85 to 90 per cent of the original investment must be scrapped if the renewal is complete.



Why all heating surface in a Ljungstrom Preheater can be renewed so cheaply. The low-cost steel sheets are of simple shape and easily cut. The group in each cell in the rotor is independent of every other, and any independent group or all can be renewed on removing one or two manhole covers, by lifting old sheets out and simply dropping in new ones.



Ljungstrom. Wt., 110,000 lb. Volume, 2100 cu.ft.

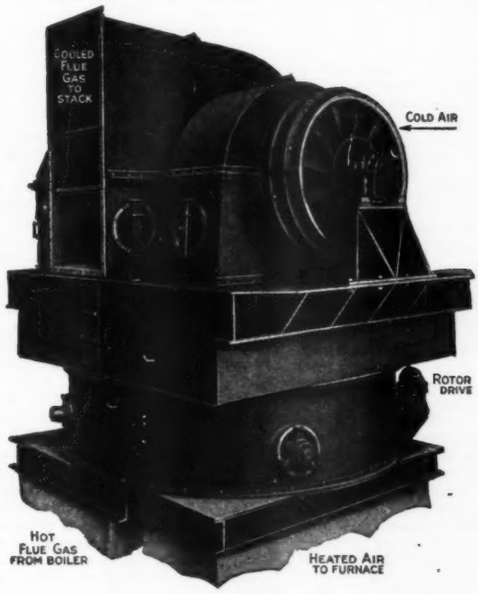
Recuperative Preheater. Wt., 220,000 lb. Volume, 3720 cu.ft.

Showing the comparative simplicity of heating surface renewal in the Ljungstrom Preheater, where all the heating metal is confined to the small middle section and is merely dropped into and lifted out of place. The recuperative preheater in contrast must be literally torn apart for a complete renewal and only the old shell, the cheapest part, is good for reuse.

* * *

In contrast, the harmlessness of corrosion and simplicity of heating surface renewal of the Ljungstrom Preheater are typical of the fine engineering design throughout—a combination for *sustained* high annual money return. The Ljungstrom Preheater repays its installation cost in from one to two years and increases plant capacity as effectively as additional boilers, which would cost much more.

Ask us for the proof, for literature and for data on what it would accomplish under your conditions. Over 800,000 boiler hp. of Ljungstrom Preheaters are in service in the U. S. A.



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duplication of equipment and installations. It is unfortunate that accurate records of such installations are not available, for it is certain that they would increase considerably the total cost of the development of this competitive area. The available records show $3,700,780 as costs of parts of the physical installations on this block. The cost of all buildings, tanks, pump stations and pipe lines in the noncompetitive block totals $964,962. Table 1 gives a summary of the comparison of development costs and production in the two areas.

TABLE 1—SUMMARY OF COSTS

	Competitive block	Noncompetitive block
Area, acres	3,550	3,550
Total production to January 1, 1930, bbls.	89,676,346	71,859,345
Estimated future production, bbls.	4,000,000	14,000,000
Total ultimate recovery, bbls.	93,676,346	85,859,345
Total number of wells	214	105
Total number of producers	117	69
Completed as producers, per cent	55	66
Average ultimate production per well, bbls.	446,366	815,803
Cost of drilling*	$14,100,000.00	$8,590,000.00
Cost of plugging wells	$351,000.00	$207,000.00
Cost of installations	$3,700,780.00	$964,962.00
Cost per barrel ultimate recovery	$0.193	$0.059

*All sums in dollars, United States currency.

Acknowledgments

The writer wishes to acknowledge his indebtedness to the Pan-American Petroleum & Transport Co. and to the Huasteca Petroleum Co. for the use of their records from which the data herein presented were obtained, and for permission to publish the paper. He is particularly indebted to Carroll H. Wegemann and E. L. Estabrook for their helpful suggestions and encouragement. To J. S. Kunkel, chief engineer of the Huasteca Petroleum Co., thanks are due for furnishing valuable information on the early development of the field and on the costs of physical installations.

HIGH PRESSURE NATURAL GAS TRANSMISSION

(Continued from Page 270)

the oil lines are of smaller diameter than the gas lines, and the incentive for higher and higher pressures in steam plants is that by reason of the temperature pressure relation of steam an increase in pressure in the higher range costs less in fuel than in the lower range, even to the extent, apparently, of more than offsetting the difficulties of controlling high pressures and high temperatures.

In the case of a natural gas pipe line, the only advantage of operating on a high range of pressure is that the gas occupies less space. This, of course, is an important advantage, but it does not seem to be sufficient to offset the disadvantages of going higher than 400 pounds gauge pressure.

Regardless of the pressure in a pipe line or of the tensile strength of the material, a certain thickness is necessary in order to give it proper stiffness for shipping and handling without injury. Our experience has been that one-quarter inch material is sufficient for this purpose for diameters up to 18-inch, with five-sixteenths inch thickness for 20 and 22-inch, and eleven-thirty-seconds inch thickness for 24-inch, which is the largest size that has been used in any quantity for high pressure natural gas pipe lines. Numerous calculations and estimates have also indicated that, taking everything into consideration, there is no ultimate advantage in increasing the thickness of the pipe, and thereby increasing its weight in the same proportion, in order to use a higher pressure, as the same advantage would be gained by using larger pipe and, when the economic limit of pipe size has been reached, putting the compressing stations closer together.

Naturally, there would be exceptions to this rule in cases where, for the best balance of all the other numerous conditions in a given section of the line, the initial portion of it might be heavier for a certain distance.

For sizes up to and including 12-inch, a pressure of 400 pounds gauge can be used with old style pipe with 10,500 pounds working stress, and for 24-inch approximately the same pressure can be used with eleven-thirty-seconds inch thickness by using the higher carbon steel. Furthermore, the plain end pipe in large quantities, as for a large pipe line, is not limited to some particular thickness, but can be procured commercially not merely to a thickness of sixteenths or thirty-seconds of an inch, but varying by decimals of an inch, to suit conditions.

Possibilities in Pipe

It will be practical to increase the working pressures slightly above 400 pounds when some manufacturer puts out a product of still higher tensile strength by use of seamless tubing or other improvement. We hear rumors already of such developments. It seems impossible to gain advantage by increasing pressures by adding to pipe thicknesses.

Assuming, then, that in designing a pipe line system, we adopt a limit of pressure of 400 pounds, gauge, the next question that interests us in the case of a long line with several compressing stations, is the most advantageous pressure drop to allow in the line before providing a compressing station to bring the pressure back to the adopted standard of 400 pounds. As stated previously, there is a certain ratio of compression, that with a fixed compressor cylinder size, is the most advantageous from the standpoint of the load on the engine. With this ratio, a lowering of the suction pressure will not increase the load on the engine, while with certain other ratios a lowering of the suction pressure will increase the load and may stall the engine, particularly of the internal combustion type.

If the suction pressure goes up, the weight of gas to be compressed is greater and the range of compression less, while if the suction pressure goes down the weight of gas is less and the range of compression greater. The rate of change in the weight of the gas is not the same, however, as the rate of change in the power required for compression.

The net indicated horsepower required to compress 1,000,000 feet of natural gas per day through various ratios of compression was determined experimentally by Mr. Weymouth and discussed at length by him, in the same paper read by him before the American Society of Mechanical Engineers, in which he analyzed the pipe line resistance. This horsepower requirement is represented by the curve known as the Weymouth horsepower curve, the equation for which, in its latest form as it appears in Mr. Weymouth's chapter in Day's Handbook, is

$$\text{Horsepower} = \frac{4.44 + 106.6 \log r}{0.97 - 0.0306\, r}$$

in which "r" is the ratio of compression.

By calculation from this formula, it will be found that for a given cylinder size, the ratio of compression at which a lowering of the suction pressure can not increase the load on the engine is about 2.8, and it has become the custom to use three compressions as a standard for the design of compressing stations unless there are good reasons for doing otherwise, there being no material difference, in this respect, between ratios of 2.8 and 3.0.

It will be found, however, that in a long line, where water supply and other conditions permit equal spacing of stations, that a compression ratio of about 1⅓ to 1½ instead of 3.0, while increasing the number of stations, decreases the total horsepower required. This is due to the fact that the pipe line friction for a given number of feet of gas is less when that gas is compressed into a smaller space, so that, when it is up to 400 pounds it is advantageous, from the standpoint of total horsepower, to keep

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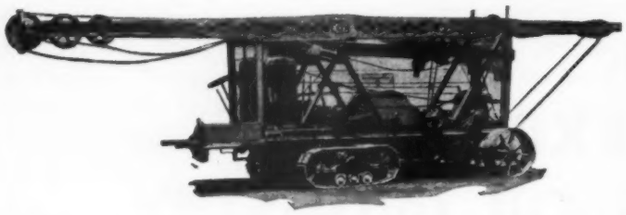

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it as near that pressure as is consistent with all the conditions.

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Acknowledgments

In addition to certain references to other notable papers whose authors are mentioned above, special acknowledgment is made of marked assistance and co-operation of three natural gas engineers of high standing. They are Alfred J. Diescher of Winfield, Kans.; Herbert R. Davis of Buffalo, N. Y., and Elwood N. Layfield of Mount Vernon, Ohio. Messrs. Diescher and Davis, after years of valuable experience in the practical operation of large natural gas systems, are now engaged in consulting work along that line. Mr. Layfield, whom the writer first met when he was secretary of the Western Society of Engineers, has been for the past 11 years associated with the Hope Engineering Co., which the writer also represents.

CENTRAL WEST FIELDS

(Continued from Page 115)

ter and early spring. The best well in any area of the State, the Ohio Oil Co.'s No. 1 in the southwest corner of the Robert Piety farm, NE, Section 32, Prairie Township, Vigo County, which was drilled to a total depth of 2,244 feet and given a shot, the first 24 hours' production amounting to 48 bbls. of an excellent grade of oil. Same company is drilling No. 1 on the Mabel Prevo farm, same section. Siosi Oil Corp. is drilling No. 1 on the Joe Thomas farm, same county, and Otto Jackson and others are drilling on an unknown farm, northeast of the Siosi Pool.

Fred R. Bays of the Dome Gas Co. drilled a test in the northeast corner of the Ross Campbell farm, NE, Section 9, Hamilton Township, Sullivan County, and got a dry hole at 700 feet.

Pike County at this time leads in development work in Indiana, as fairly good gas wells are found there as well as average oil wells. The best of the late wells in this county was the Wiser Oil Co.'s No. 7 well, 1,300 feet from the north line and 200 feet from the west line of the William Phillips farm, NE, Section 23, Logan Township, and in the Oatsville area, which produced an initial of 35 bbls. Top of sand in this well was found at 1,327 feet and pay sand from 1,332-56 feet, total depth of hole 1,367 feet. Blue Bird Oil Co.'s No. 3 in the southeast corner of the T. D. Phillips farm, NE, Section 22, also in Logan Township, pumped 4 bbls. initial from 985 to 1,031 feet. In the same township, H. C. Dabry and others' No. 5 well, 610 feet from the south line and 200 feet from the west line of the G. Stewart farm, SW, Section 23, was a duster at a depth of 1,337 feet. Charles L. Diver and others abandoned their No. 1 on the Rubert Walton farm, same township. In Patoka Township, same county, the Ohio Oil Co. abandoned No. 3 on the John Geiser farm, SW, Section 2, and the Murphy Oil Co. did the same with No. 1 on the Eliza Martin farm, Section 11, same township, on account of being too light producers. In Monroe Township, same county, for the same purpose the Murphy Oil Co. abandoned No. 4 on the Fred A. Butler farm, Sections 23-24, and Thomas Flynn pulled out his Nos. 1 and 4 W. W. Shy farm, SE, Section 21, same township. Late reports say the test by H. H. Risher in the northwest corner of the James M. Thomas farm, NW, Section 30, Washington Township, Pike County, and near the hamlet of Alford, is a dry hole instead of a producer. This well had slight showings of both oil and gas at 1,153 feet, but not in commercial quantities.

ILLINOIS

Only three completions were reported from the Illinois fields, the best producer being Watson and others' No. 4 in the southwest corner of the Martin Newlin farm, NW, Section 13, Prairie Township, Crawford County, which produced an initial of 50 bbls. at 1,015 feet. In the same township, Gus Lowery and others' second test, 600 feet from the north and west lines of the S. D. Akeman No. 2 farm, NW, Section 36, pumped but 1 bbl. at 1,000 feet deep.

In the western part of the State, the Ohio Oil Co.'s second test 368 feet from the south line and 134 feet from the west line of the A. J. Shondy farm, NW, Section 34, Sugar Loaf Township, St. Clair County, in the Dupo Field, showed an initial of 45 bbls. from 616-62 feet.

No completions were reported from the Bridgeport Field of Lawrence County. Associated Producers Co. abandoned Nos. 1 and 2 on the Thally-Hollister farm, NW, Section 19, Dennison Township, same county. Karns and others are drilling on the C. C. Ackeman farm, Section 1, same township. In Lawrence Township, the Ohio Oil Co. abandoned Nos. 1 and 2 R. R. Trueblood farm, SW SW, Section 17, and No. 1 on the Milligan & Dickerson farm, SE, Section 18, same township.

In the Casey shallow sand field of Parker Township, Clark County, R. E. Moffat and others are drilling No. 7 on the Hattie L. Brisco farm, Section 32, and Charles Karns and others are drilling No. 1 N. Cunningham farm, Section 6, same township. Unknown parties have started a test on the W. B. Johnson farm, in Section 36, Casey Township, same county.

MOTOR CARS, AIRPLANES AND THE OIL INDUSTRY

(Continued from Page 330)

ful alloys, alloys which made possible the discarding of cast iron and brass in favor of special steels and special alloys, each suited to its particular specialized need, all combining and conspiring together to create a practical and usable vehicle. Parts which, when made of cruder material, required pounds in weight in order to supply necessary strength shrunk to ounces; heat treating developed a new and important place for itself.

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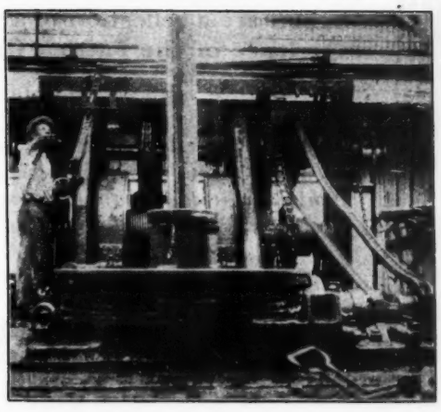

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the crankcase; it would have been an excellent crankshaft for an ocean liner. Incidently, that crankshaft was solid.

Contrast with Today

Contrast that machine with any of the motor cars on the road today. The crankcase of the modern automobile is cast of an aluminum alloy, which is not only light, but which is able to give our old cast iron crankcase cards and spades, and then win hands down. The cylinders are probably cast in a block with walls that 20 years ago would have been thought pretty thin. The pistons in our machine of 1905 would have made wonderful projectiles had they been loaded with T.N.T., and hurled from a gun in the recent World War. They were so heavy that lying as they did in a horizontal position in the cylinders of this wonderful engine they soon wore those cylinders completely egg-shaped. The pistons of today, made of their special aluminum alloys, with their trick lightweight rings, are a thousand times better than the pistons of 1905, and are about as heavy as a baking powder can. I remember very well what the front axle looked like on that machine. It was a corker. As compared to the graceful, slender, strong and lightweight axles of today, it was a joke.

Revolutionized Oil Business

Nevertheless, these crude automobiles of the first five or seven years of this century revolutionized your business. As bad as they were and as expensive as they were, they did run and people wanted to ride some way other than back of a horse. You soon found that gasoline was more important than what we used to call coal oil. I am told that in the early days, the gentlemen in your business had to be watched carefully to see that their coal oil so-called had no gasoline in it because of the supposed hazard that might surround the use of the lighter oil in the old-fashioned lamp or lantern. Very soon, you were anxious to get not only all the gasoline that you thought it possible to get out of petroleum, but you were sneaking around corners trying to squeeze a little out of the coal oil. This, of course, was before the marvelous days when due again to the buying power of the public you were able to develop marvelous processes for the production of motor fuel, which, if I am correctly informed, make it possible for you to make gasoline out of almost anything. Because the public was willing to buy automobiles and had to buy fuel to run them, your industry had injected into it a very interesting and extensive development of all of the scientific possibilities, which, up until then, had lain dormant. While the motor car manufacturer and his staff of engineers were moving ahead by leaps and bounds in the matter of alloys, heat treating machine tools, progressive assembly and refinement of design, you were moving forward in step with them ever ready to furnish a proper fuel to keep these motor cars buzzing on the roads.

Led to Aviation

Both of you were unwittingly but nevertheless truly paving the way for this more recent development of aviation. Just who may have been responsible for the discovery of the fundamental principles involved in flight of heavier than air craft is at the moment unimportant. The important thing is that just when you were in the midst of your most intensive research and development work it was discovered that wings made in a certain manner, hooked together in a certain manner, with a lightweight power plant, could under very favorable circumstances be induced to leave the ground, get into the air and stay in the air for a short time.

Suppose that this discovery had been made not in 1905 but in 1885. It would not have meant anything. It needed the preliminary refinement of construction materials carried on by your comrades, the motor car manufacturers, to make possible the practical development following this discovery of the fundamentals of flying. If the airplane engine had had to be built of cast iron, cast brass and those other metals that might have been available in 1885, no matter how clever young Curtis or the Wright brothers might have been, of course, they could not have procured a power plant to lift its own weight off the ground. There must have been some sort of divine steering of the situation. Once we knew how to fly, we had you ready with fuel and the experience of the motor car people at our elbow, ready to help us produce engines that were strong, lightweight, and really adapted to this new job. It is a sort of merry-go-round as I see it. Without the motor car, the petroleum industry would still be busy making kerosene to be peddled out in little gallon cans with a potato on the nozzle. Without the gasoline, the motor car manufacturer would still be struggling with steam or some other trick method of creating power. Without the intensive work done individually by the motor car manufacturer and by your industry, and jointly by your two industries, in seeing to it that your fuel and their engines got along well together and behaved themselves, there would not have been any background upon which the airplane could lean; but there was a beautiful background and we have moved forward in our 25 years of existence much more rapidly than any equally revolutionary art ever moved forward, not because of our own efforts alone, but because of the foundation which you and your motor car friends provided for us.

Use of Lubricants

I have neglected to mention lubricants. Your lubrication development has been even more marvelous than your fuel development. Even the cumbersome pistons of 1925 might not have worn their cylinders as lopsided as they did if they had been lubricated with a lubricant of 1930. I do not think there is any better example of teamwork in industry than is to be found between the motor car manufacturers and the petroleum industry. We come in as a sort of second cousin in that teamwork. We are enjoying the greatest sort of assistance, co-operation and help, not only from our friends who make motor cars, but also from you, who perhaps are beginning to see in our industry a growing market for your fuel and lubricants. Some day, perhaps, this team will be truly a three-sided affair, with 33⅓ per cent on each side. We are as yet the baby in the triangle, but thanks to you and thanks again to the enthusiasm and spendthrift nature of the American public, we are pushing ahead. The airplane of today is quite a marvelous instrument. Just a few years ago, it was considered an achievement to have an airplane engine in condition which would warrant its running 50 to 60 hours without some sort of difficulty which would result in its stopping. Current records of our company show that we have run gasoline engines in airplanes as much as 500,000 miles without mechanical difficulty, resulting in stoppage. Of course, a great deal of work was done on these engines at proper intervals. They were properly maintained and inspected, but just a few years ago if it had been suggested that an engine could be so constructed and so maintained that it would run for 500,000 miles without trouble that statement would have been received with lifted eyebrows. Five hundred thousands miles is approximately the equivalent of 20 trips around the world.

Engine Development

The engine which I described as being installed in a certain 1905 automobile was alleged to develop 15 horsepower. I have forgot how much it weighed, but I feel reasonably sure that it weighed more than the 400-horsepower engines produced by Pratt & Whitney, an associated company of National Air Transport. The difference is, of course, accounted for by these new marvelous materials, increased efficiency of design and experience. In many respects, aeronautical design is to go far and beyond motor car design. It should be remembered that not only do we have to provide in our airplanes power necessary to pull them through the air at a high speed, but we also have to provide power to sustain them in the air. In aeronautics we soon learn to think of horsepower in

large units; the trimotored airplanes rather generally in use in America in the business of carrying passengers and mail and express are equipped with engines totaling, in some cases, as much as 1,500 horsepower, capable of carrying pay loads, exclusive of fuel of approximately 1½ tons, with cruising speed of approximately 120 miles per hour. Experimental airplanes are being constructed here and abroad with even more horsepower. At the moment, it is impossible to say whether the future development will be along the line of larger units with more and more power or a multiple of smaller units.

Carries 100 People

In Germany, there has recently been built a ship that on certain test flights has carried 100 people. I am afraid that it is more spectacular than practical. Nevertheless, it has actually flown with that tremendous load. We are just starting the real commercial adaptation of the airplane. The next 10 years will, I am certain, see a great forward movement. Nothing could be more interesting than to be a part of such development. Each move is more or less without precedent. Of course, we make our share of mistakes, but speaking generally I think it may be truthfully said that aviation is moving forward from the start, which it received at the hands of the motor car and petroleum people.

The task of buying fuel for airplanes has, because of the excellent work done by the men in your industry, been greatly simplified. A few years ago, our ships were constantly getting into difficulty due to faulty fuel or fuel with water in it. Stoppage due to such causes are almost unheard of today. Only a few years ago, it was quite a stunt to be able to keep oil temperatures within their proper range. Today, this is no problem notwithstanding the fact that our tendency seems to be toward the higher temperature air-cooled motors. With your continued co-operation, I think that we are in a fair way toward creating a new and really sizeable market for your products. Unfortunately for us, on the other hand, fortunately for you, our large horsepower units consume fuel in large quantities. As we fly more, we will burn more gas. It may be that within my lifetime we will assume a place equal to the motor car in the consumption of the products of your factories. I hope so; because if we are able to become major customers of your industry, then we ourselves will be in a business that is quite worthwhile. We cannot get along without you. Maybe, one day you will feel that you cannot get along without us. Just now, of course, we are kindergarten customers.

Difficult Task

We, who are in air transportation, have a rather difficult task cut out for us to do. We have gone into competition with the best railroad systems in the world, which are already serving the American people as no other country in the world is served, with rapid, comfortable and relatively inexpensive surface transportation. From a point of view of air mail we not only have these marvelous trains to compete with but we have the excellent telegraph companies ready and serving the country at low rates in an excellent manner. We have the long distance telephone developed to a degree unthought of in any other country in the world.

Our success will mean that the American people are interested in even more rapid transportation than the rails are prepared to offer for themselves their express packages and their letters.

In the past few years, we have learned how to run our airplanes with remarkable regularity, with an unbelievable adherence to schedule and with a minimum of risk to cargo or passengers. I really believe that we are prepared to serve as passenger and cargo carriers to any extent that the public may demand. It may be truly said that our continent is now only 24 hours wide for the business man who is in a hurry. Just how many people are really in a hurry and just how many will take to our new method of transportation only time will tell. Passengers who fly with us all seem, with few exceptions, to enjoy their experience and to find flying a comfortable and pleasant method of travel. The increased use of air mail, and it has increased almost 500 per cent in the past two years, would seem to indicate that it is to the advantage of American business to have a mail service speedier than that offered by the trains. In these days of keen competition, all business is, it seems, organized on a sort of high speed basis. We are endeavoring to take advantage of that fact. For one, I believe that each year will see increased use of all types of air transportation. I believe that the demand of the public will push us and urge us to greater achievement, just as it has pushed you and pushed the motor car people in the last 20 years. The answer to this belief will be forthcoming as time rolls on.

VELOCITY OF OIL FLOW THROUGH TUBING

(Continued from Page 253)

er of the flowing gas to hold an oil spray in suspension. The flow velocities of the oil-gas mixture, therefore, should have considerable significance.

Study of Flow Velocities

To attempt to determine optimum and critical conditions, a study of flowing velocities was begun. By "optimum" as used here, is meant the lowest velocity or smallest amount of circulating gas necessary to produce maximum fluid. By "critical" is meant the point where continuous flow gives way to severe heading or cessation of flow.

To facilitate this study a monographic chart was prepared for calculating the flow velocity at the base of the flow tube or any other point where the pressure is known (Figure 1). The formula upon which the chart is based is as follows:

$$\frac{\text{M. cu. ft. gas per sec.}}{\text{Pressure in atmospheres}} \text{ plus oil, cu. ft. per sec.} = \text{Velocity ft. per sec.}$$

$$\text{Capacity of one linear ft. flow tube in cu. ft.}$$

The chart is graduated in the familiar 1,000 cubic feet per day, barrels per day, pounds per square inch and actual and nominal diameters of flow tubes. The

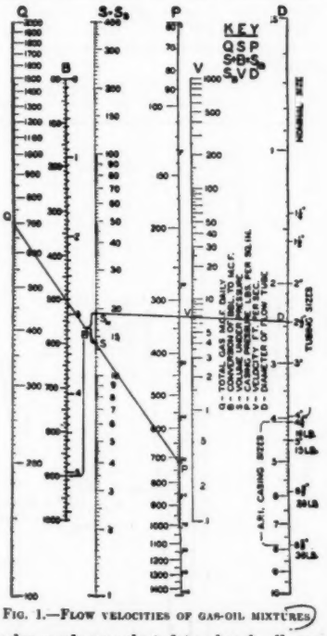

FIG. 1.—FLOW VELOCITIES OF GAS-OIL MIXTURES

scales used are selected to absorb all conversion constants.

The chart as shown is not corrected for compaction due to the weight of gas in the casing. This may create a pressure

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at the shoe as much as 200 pounds or more, greater than the recorded casing pressure in very deep wells with high casing pressure. Nor is it corrected for solubility of gas, which introduces a large correction for high pressure wells with low gas-oil ratios; nor for loss of head due to friction in descending circulated gas; nor for correction due to changes in temperature, or deviation from Boyle's law. These factors are all computable and should be introduced in order to get really accurate results. However, extreme accuracy is probably not justified in the results, especially in a preliminary study, and since only relative values were desired the calculations were made from the chart alone.

The chart is easy to use and calculations may be made quickly. In the problem shown on the chart, a well producing 900 bbls. per day, 700,000 cubic feet with a casing pressure of 720 pounds is illustrated. A line between 700 on the Q scale and 720 on the P scale intersects the S scale at 14. On the B scale 900 bbls. is read as 5 M. cubic feet and added to 14 on the S scale, making 19. A line between 19 (S_B) and 2½-inch tubing on the D scale intersects the V scale at 6.8, which is the desired tubing shoe velocity in feet per second.

Tabulation of Tests

The tabulation of tests shows 12 cases where critical velocities in flow tubes were determined. In all but two cases, both of which were the same under different conditions, values of the critical velocity ranged from 4.3 to 7.7 feet per second. This is far below the theoretical velocity for suspension of oil mist in gas[3], but no actual case of higher critical velocity was found. The cases where 1.4 and 2.6 were determined as critical velocities were where the "volumetric gas-oil ratio under pressure" shows that the gas-oil mixture probably existed as a foamy liquid rather than a gas-laden mist. In this condition the velocities found should be adequate to prevent flow tube slippage. The data show that except in such cases as the above, minimum flow velocities of less than 8 feet per second should be avoided.

The determination of optimum velocities was less definite. Values of shoe velocities from 6.5 to 18.5 were found in eight examples; 15 appears a good average.

Optimum conditions obviously involve variables in a different sort of balance. Here the additional lightening of the fluid column is opposed by added flow friction. Optimum conditions should vary with different sizes of flow tubes. Shoe velocities should be less significant, since velocities would necessarily be above the critical.

The velocities with which maximum oil is produced ordinarily have a rather wide range. Velocities quoted are the minimum at which this amount of fluid is produced.

Both critical and optimum conditions obviously involve factors other than flow tube velocity. The size of the flow tube, whether flowing through tubing or in the annular space, the relation between the bottom of the flow tube and the producing formation and other variables have an important bearing. In well No. 6, with tubing set at 7,000 feet, 800 feet off bottom, gas flow is continuous but oil is produced only when the well makes a head sufficient to raise fluid up to the bottom of the flow tube. An analysis of the data in Table 1 will suggest what some of the other variables are and give some idea as to their effect.

This paper is intended to be only a preliminary study of the effect of velocity, and tests were limited to the available types of wells. Broader phases of production of flowing wells such as position and size of flow tubes, tapered strings, bottom beans, packers, etc., are not considered. This is not done with the idea of minimizing their importance, but simply to restrict the scope of the paper.

The study of flow velocities is believed to yield valuable information and justifies further investigation.

Acknowledgments

The helpful suggestions and material assistance of V. H. Wilhelm and H. C. Stone in the preparation of this paper are gratefully acknowledged.

WEST TEXAS GEOLOGISTS

FORT WORTH, Tex., Sept. 29.—A group of West Texas geologists made a trip through the Arbuckle Mountains of southern Oklahoma, September 27 and 28, to study the pre-Pennsylvanian stratigraphy. The party was led by Dr. Charles N. Gould of Norman, director of the Oklahoma Geological Survey, and Dr. C. W. Tomlinson of the Schermerhorn Oil Co. at Ardmore.

The geologists met Friday evening at the Hotel Ardmore.

EFFECT OF EDGE WATER ON RECOVERY OF OIL

(Continued from Page 253)

least, by proper well spacing, producing methods, and rate, method and sequence of well drilling, if consideration is given these factors in the development and operation as a unit of a structure bearing oil and gas.

7. The effectiveness of recovery by natural water-flooding is of sufficient consequence to become a strong argument in favor of making an operating unit of the whole pool or structure rather than of the individually owned and operated lease.

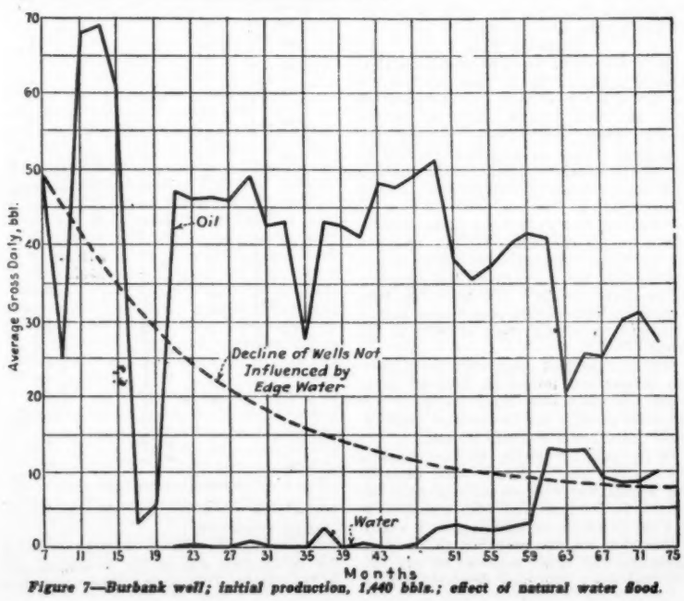

Figure 7—Burbank well; initial production, 1,440 bbls.; effect of natural water flood.

WILDCAT OPERATIONS IN SOUTHWEST TEXAS

(Continued from Page 103)

Southern Crude Oil Purchasing Co.'s No. 1 Holbien-Wormser, 990 ft. from E line, 1,000 ft. from S line of Blk. 39, E. P. de Maguellas Sur. ....T. D. 3,510 ft.; drlg. shale.

BEE COUNTY

William F. Morgan and Independent Oil & Gas Co.'s No. 1 Quincy, C Blk. 9 of 11,000-ac. Quincy Subd. of Bee County ....T. D. 4,947 ft.; setting screen.
O'Neal & Catlett's No. 1 Pat Pugh ....Location.
Simms Oil Co.'s No. 1 Holzmark, 830 ft. SE line, 2,952 ft. SW line of J. A. York Sur. ....T. D. 3,548 ft.; gauged 56,000,000 ft. gas.
S. R. Co.'s No. 1 Theis, 2,700 ft. from N line, 300 ft. from C line of 732-ac. tract, Burns Sur. ....T. D. 4,560 ft.; drlg.
Huribut et al's No. 1 Mrs. D. Chestnut ....Spudded.
Walter Rawlins' No. 1 P. L. Campbell, C B.&B. Sur. ....Moving in machine.
E. S. Price's No. 3 Weiss, 900 ft. due NE of No. 1 Weiss..Location.
E. S. Price's No. 2 Weiss, 900 ft. due SW of No. 1 Weiss, B.&B. Sur. ....T. D. 1,900 ft.; drlg.
Cosden Oil Co.'s No. 1 Stoltzfus, 2,310 ft. to S and E lines of Sec. 14, Ragley Subd. of C. Miller ranch, Uranga Sur. ....T. D. 1,500 ft.; drlg.
Humble and Huribut and others' No. 1 J. C. Wood, 150 ft. from NW line, 1,144 ft. from SW line fo P. T. Irrigation Co. ....T. D. 4,670 ft.; coring.
The Texas Company's No. 1 McCampbell, 150 ft. from N and E lines of 161-ac. tract, R. Pena Sur. ....Location.
Edwin Jones' No. 2 Rapp, Tuletta Townsite, 630 ft. N line, 508 ft. E line of lease ....Building derrick.

BEXAR COUNTY

Moore-Jauer's No. 1 Holly R. Ellison ....T. D. 2,170 ft.; standing.
K. M. S. Pet. Co.'s No. 1 E. Salicky, 132 ft. from E line, 10 ft. S line of tract, Blk. 15, Mission Gardens ....Location.
J. M. Russell's No. 1 F. L. Price, 1,590 ft. to N line, 660 ft. W line of tract in Angel Navarro Sur. ....T. D. 206 ft.; standing.
J. M. Russell's No. 1 A. O. Miles, 1,600 ft. N line, 600 ft. W line 450-ac. tract, Angel Navarro Sur., 10 miles S from San Antonio ....T. D. 483 ft.; drlg. shale.
Henry Yelvington et al's No. 1 Beck, 365 ft. from W line, 310 ft. from S line 100-ac. tract, SW cor. of P. W. Hays Sur., 7 miles E from San Antonio ....T. D. 1,470 ft.; shut down.
Snyder, Reeves et al's No. 2 Glasscock, 12 miles NE of San Antonio ....T. D. 200 ft.; drlg.
August Magel's No. 1 Alvin Beck, 520 ft. from W line, 1,300 ft. from S line of Sur. No. 36 ....Location.
Penn Oil Co.'s No. 1 Cooksey, 1,150 ft. to E line, 150 ft. to N line of survey, J. Riall Sur. ....T. D. 100 ft.; set casing.
Weibacher et al's No. 1 Ernst, 6,400 ft. S line, 900 ft. W line of J. Christopher Sur. ....T. D. 105 ft.; drlg.
Carl Bros. et al's No. 1 Gembler, 160 ft. N line, 170 ft. E line Gembler tract, C. Tejeda Sur. ....T. D. 1,550 ft.; abandoned, dry.
J. E. Weatherall and Ben C. Hilman's No. 1 Talley ....Location.

CALDWELL COUNTY

W. E. Allaun's No. 1 Cosey, SW cor. of tract ....Location.
W. E. Allaun's No. 2 McKean, 300 ft. W of No. 1 ....Location.
Batts et al's No. 1 E. P. Roefur ....T. D. 1,050 ft.; drlg. shale.
Gulf Prod. Co.'s (Hertz & Thomas') No. 1 Kelley, 1,961 ft. from NE line, 150 ft. from NW line of Kelley tract, J. A. Neil Sur. ....T. D. 2,300 ft.; drlg. marl.
Cargill et al's No. 1 Thomas, 1,505 ft. from E line, 150 ft. from NE cor. of A. W. Jordan tract, J. Roberts Sur. ....Derrick.

CALHOUN COUNTY

The Texas Company's No. 1 Thomas in the J. D. Tilly Sur. ....T. D. 5,240 ft.; drlg. sandy shale.

COMAL COUNTY

Caldwell & Lanier's No. 1 T. J. Byler, 175 varas from W line, 370 varas from N line of 320-ac. tract in the H.E.&W.T. No. 5,894 Sur. ....T. D. 328 ft.; set casing.
New Braunfels Oil & Gas Co.'s No. 1 Adolph Seidemann, 269 ft. to NE line, 470 ft. to NW line of farm in the A. M. Esneuricals 11-League Sur., 1 mile SE from New Braunfels ....T. D. 1,570 ft.; standing.

DEWITT COUNTY

Penn Oil Co.'s No. 1 Junker, center N half 201-ac. tract, Pettus Sur. ....Moving in machinery.
H. T. Roe's No. 1 Leinhardt ....T. D. 2,170 ft.; shut down.
A. H. Gibson et al's No. 1 Von Roeder, 750 ft. N line, 200 ft. E line of farm, W. G. Hill League ....T. D. 1,480 ft.; reinstated; preparing to deepen.

DUVAL COUNTY

Vacuum Oil Co.'s No. 1 Duval County Ranch Co., 3,143 ft. N line, 1,368 ft. S line, Sur. 293 ....T. D. 1,724 ft.; flowing by heads.
Sal Oil & Gas Co.'s (Southern Oil Co.) No. 2 Welder-Wood, 1,980 ft. E line, 2,490 ft. N line, Sur. 215 ....T. D. 2,500 ft.; standing.
Sloan et al's No. 1 Luby, SW cor. of Sur. 593 ....Location.
S. R. C. Oil Co.'s No. 1 Duval County Land Co., Sur. 280 ....Spudded; water well.

EDWARDS COUNTY

Phillips Pet. Corp.'s No. 2 A. G. Holman, 320 ft. from N and E lines of SE of tract, C.C.S.D.&N.G.R.G Sur. No. 25 ....T. D. 5,566 ft.; drlg. lime.
James Dalgish's No. 2 Peterson, 850 ft. N line, 1,100 ft. W line of Sec. 82, Blk. E in the H.E.&W.T. Sur...Location.
James Dalgish-Morrow's No. 1 Peterson, NW cor. Sec. 82, Blk. E, H.E.&W.T.R.R., NE cor. of county in the H.E.&W.T.R.R. Sur. ....T. D. 4,012 ft.; drlg.

FRIO COUNTY

A. H. Wray's No. 1 Burns estate, 700 ft. N, 330 ft. E of C Sec. 123, Antone Hupzor ....T. D. 1,817 ft.; drlg. shale.

GOLIAD COUNTY

Union Prod. Co.'s No. 12 George Ray, 2,350 ft. SW of NE line, 330 ft. NW of SE line, George A. Ray 400 ac. in the Wm. Southerland Sur. ....T. D. 5,134 ft.; drlg.
A. G. Riemenschneider's No. 1 A. T. Fromme, 275 ft. from N line, 912 ft. W line of 300-ac. tract, P. Dexeter Sur. ....T. D. 2,206 ft.; drlg.
Gibson Oil Co.'s No. 1 Cyrus Parks, 3,000 ft. S and 2,500 ft. E of NW cor. of Parks ranch, Ferguson Sur. ....T. D. 200 ft.; spudded.

GONZALES COUNTY

Mardon Oil Co.'s No. 1 Borrer, 150 ft. N and W in the James Stewart Sur., 5 miles NW from Waelder ....T. D. 1,850 ft.; shut down.
Mardon Oil Co.'s No. 1 Robinson ....T. D. 3,284 ft.; waiting for orders.
Linden Pet. Corp.'s No. 1 Hensley, 650 ft. N line, 1,110 ft. W line of J. W. Hensley 100 ac. in the James Smith ....T. D. 4,808 ft.; abandoned; sulphur water.
United North & South Dev. Co.'s No. 2 Preston, 1,050 ft. NE, 450 ft. NW of upper S or SW cor. of Oethkin one-third league, 900 ft. SE of Preston No. 1....Location.
A. J. Keiffer et al's No. 1 B. B. Dix, 550 ft. W of E line, 2,775 ft. N of S line (Guadalupe River) in the Ira Nash Sur., 4 miles SE from Darst Creek ....T. D. 2,816 ft.; coring.
Andibus & Cummings' No. 1 R. D. & J. C. Miller, 522 ft. from S line, 1,000 feet from E line, Ann Williams Sur. ....Location.

GUADALUPE COUNTY

Guy Lewis' No. 1 Arno Link ....T. D. 847 ft.; standing
J. S. Suttle's No. 2 A. Baenzinger, 40 ft. E line, 150 ft. S line of tract in the A. O. Mansola Sur., 5½ miles S from Seguin ....T. D. 1,775 ft.; coring chalk.
Grayburg Oil Co.'s No. 2 Wells, 5,730 ft. E line, 2,490 ft. S line of NE cor. of Wells tract in the James D Baume Sur., 6 miles SW from Darst Creek ....T. D. 3,685 ft.; fishing.

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Brown Hinds et al's No. 1 George Altzger, 1,300 ft. from SE line, 1,100 ft. from SW line of 120-ac. tract in A Mansola Sur. ..... T. D. 1,975 ft.; shut down in Del Rio.
Ray Oil Co.'s No. 1 R. Felsing, 300 ft. NW line, 450 ft. NE line 120-ac. tract in the M. Baker Sur. ..... T. D. 900 ft.; shut down.
Miller & Calhoun's No. 1 Lindenberger, 750 ft. from E line, 650 ft. from S line of 250-ac. tract ..... T. D. 1,150 ft.; drlg.
Cranfill & Reynolds' No. 1 Meyer, 150 ft. S and E lines 160-ac. tract, J. Canter Sur. ..... T. D. 2,006 ft.; topped chalk.
O. K. Emerson's No. 1 C. A. Phillips, center of 80-ac. tract, Velda Sur. ..... Location.

HAYS COUNTY

Hailey & Whittington's No. 1 Heidenrich ..... T. D. 735 ft.; shut down.
San Marcos Oil & Gas Co.'s No. 1 A. H. Alford ..... T. D. 402 ft.; drlg.

JACKSON COUNTY

The Texas Company's No. 1 Mitchell, 1,750 ft. E, 880 ft. N of SW cor. Ewing Sur. ..... T. D. 6,044 ft.; drlg. sand.

JIM HOGG COUNTY

Cole Petroleum Co.'s No. 1 Allen, 150 ft. from W line, 336 ft. from N line, Blk. 7, Sur. No. 23 ..... Location.
Wm. H. Barnhart's No. 1 McCampbell, 450 ft. to W line, 150 ft. to N line, Lot 33, Barnhart Subd., Los Viboritas grant ..... T. D. 1,580 ft.; drlg.
H. E. Watts' No. 1 Gomez, 4,200 ft. to N line, 1,400 ft. to E line of Sur. 125 ..... T. D. 500 ft.; standing.
J. D. Pulliam's No. 1 Jones, 1,020 ft. W line, 1,020 ft. S line, Share 5-A, Hinojosa Sur. ..... Rigging up.

JIM WELLS COUNTY

J. Walsh et al's No. 1 W. D. Wade, 1,035 ft. NE line, 300 ft. NW line of N cor., Lot 1, Blk. C, W. H. Bode Subd. ..... T. D. 210 ft.; set 10-in. surface csg.; waiting on cement.

KARNES COUNTY

Clayton & Pierce's No. 1 Barnett in the Alex Hunter Sur., 6 miles N of Karnes City ..... T. D. 2,916 ft.; drlg.
J. F. Morrissey et al's No. 1 Ragsdale, 660 ft. SW of C of NE line of 170-ac. farm in the McCoull Sur. ..... T. D. 1,380 ft.; resumed drlg. (corrected depth).
Dr. Hewitt's No. 1 W. E. Porter, 650 ft. from N line, 700 ft. from W line of 416-ac. tract in the Victor Blance Sur., 8 miles SE from Runge ..... T. D. 2,700 ft.; shut down.
Huribut et al's No. 1 Newberry, 450 ft. SE and SW lines of Newberry 428-ac. tract, Carlos Martinez Sur. ..... Rigged up.

KENDALL COUNTY

Borgett et al's No. 1 Haag, W. Avery Sur. ..... T. D. 1,110 ft.; shut down.
A. S. Mowinkle's No. 1 Kaston, 150 ft. from N line, 150 ft. from E line of tract, Sur. No. 734, 9 miles due W of Kendalia ..... T. D. 1,435 ft.; drlg.
Sitton et al's No. 1 Garvin, C of NE of D. L. Richardson Sur. in the D. L. Richardson Sur., 1 mile NE from Kendalia ..... T. D. 850 ft.; shut down.
Dickinson et al's No. 1 Edmonson, 150 ft. from S line, 350 ft. from W line of tract in the J. O. Blair No. 72 Sur., 1 mile NW from Kendalia ..... T. D. 40 ft.; spudded in and shut down.
Dixon Oil Co.'s No. 1 Ottmer Behr, W of H.T.&B.R.R. Sur., 3¼ miles SE from Sisterdale ..... T. D. 2,250 ft.; drlg.
P. B. Sterling's No. 1 R. J. McCrocklin, 1,350 ft. from N line, 250 ft. from W line of the B. G. Owens Sur., 4 miles W from Kendalia ..... T. D. 966 ft.; drlg.
R. M. Perkins' No. 1 J. Lawhon, Sec. 10, 2,475 ft. E line, 1,488 ft. S line ..... T. D. 705 ft.; fishing.
Permian Basin Oil Co.'s No. 1 Boles, S.A.&M.G. Ry. Sur. No. 542¼ ..... Spudded.
Hardy Sitton's No. 1 McMillan, south central part of 180-ac. lease, B. Williams Sur. ..... Location.

KERR COUNTY

Evans et al's No. 1 Love Ranch, 100 ft. from S line Sur. 1,597, 1,000 ft. E of W line of J. Martinez No. 1,594 Sur. ..... T. D. 1,885 ft.; drlg. shale.

KLEBERG COUNTY

Bowen & Sarles' No. 1 Robert, H. Simmons in the A. Houston Sur. No. 611, Sec. 7, King Subd., 150 ft. out of NW cor. of SW ..... T. D. 1,580 ft.; drlg. shale.

KINNEY COUNTY

Magnolia Pet. Co.'s No. 1 Whitehead-Wardlaw, 2,640 ft. W line and S line of Melton Valdez grant ..... T. D. 3,315 ft.; fishing.
Mardon Oil Co.'s No. 2 Jim Clamp ..... T. D. 1,389 ft.; testing.
A. Blume et al's No. 2 Herbst, 1,731 ft. W and S lines of Sur. in the Poindexter-Burns Sur. ..... T. D. 275 ft.; shut down.

KIMBLE COUNTY

Lindley Bros.' No. 1 Anderson, Sec. 178, Mubenger Sur. ..... T. D. 990 ft.; shut down.
C. L. Bryant et al's No. 1 Lambert, 7,700 ft. N and W lines of F. Lotta Sur. ..... T. D. 850 ft.; drlg.

LAVACA COUNTY

Newton Oil Co.'s No. 1 Reeves, cor. of S line of Reeves tract, John Huesser Sur. ..... Building derrick.

LIVE OAK COUNTY

Jacob, Bussini & Pickett, Inc.'s No. 1 C. E. Kay, in the Bridgett Fadden Sur., 2 miles E from George West. ..... Spudded.
Houston Oil Co.'s No. 1 D. W. Snyder, 630 ft. from S line, 150 ft. from E line of Snyder tract, T. E. Garner Sur. ..... Rigging up.
O. Stalley et al's No. 1 Nichols, 2,000 ft. from W line, 500 ft. from S line in the Ayers Sur. ..... Location.
Illinois Exploration Synd.'s No. 1 Reeves-Brown, 1,300 ft. S of Sellers tract, 1,800 ft. E of Ry. ..... Rigging up.
Penn Oil Co.'s No. 1 Lyne, 900 ft. to W line, 330 ft. from S line of Sec. 69, on Devonian block ..... T. D. 2,909 ft.; drlg. shale.
Sid Keoughan's No. 1 C. E. Terrell, 6,000 ft. from N line, 1,000 ft. from E line, Dan O'Boyle Sur. ..... Rigging up.

LEE COUNTY

Burt et al's (M. D. Rickett) No. 1 R. C. Sanders ..... T. D. 2,910 ft.; drlg. shale.
A. H. Wheeler and associates' No. 1 fee, 14 miles NE from McDade, Blk. 47, Donohoe Sur. ..... T. D. 1,620 ft.; shut down.
J. P. Perry et al's No. 1 W. H. Thomas ..... T. D. 875 ft.; shut down.

McMULLEN COUNTY

Mogul Pet. Co.'s No. 1 Martin, 150 ft. NW line, 150 ft. to SW line of E. Melon No. 212 Sur. ..... T. D. 241 ft.; shut down.
Sheree, Brodie and Emick's No. 1 Shiver, Henry Brewer Sur. ..... Spudded.

MAVERICK COUNTY

Rycade Oil Corp.'s No. 6 Chittim, 1,445 ft. from S, 320 ft. from W of Sec. 116, Blk. 7, L.&G.N. Sur. ..... T. D. 3,475 ft.; standing.
Rycade Oil Corp.'s No. 5 Chittim, 600 ft. W of No. 3 Chittim, 500 ft. E line, 225 ft. from S line of SE Sec. 115, Blk. 7, in the L.&G.N. Sur. ..... T. D. 5,100 ft.; drlg. lime.
Rycade Oil Corp.'s No. 5 Sullivan, in C of Sec. 82, Blk. 7, in the L.&G.N. Sur. ..... T. D. 7,092 ft.; fishing.

MEDINA COUNTY

Pat Armstrong's No. 1 C. W. Butts, in George C. Hanson Sur. ..... T. D. 1,918 ft.; dry and abandoned.
National Oil Co.'s No. 1 Howard, 1,750 ft. E of W line, 1,854 ft. N of S line of survey in the John George Sur. No. 9, 10 miles S of Dunlay ..... T. D. 1,645 ft. bailing.
Caldwell et al's No. 1 L. W. Burrell ..... T. D. 2,167 ft.; fishing at 518 ft.
Donaldson Oil & Dev. Co.'s No. 2 Hillenmeyer, James Hillenmeyer No. 25 Sur., 500 ft. to E line of survey, 150 ft. to S line of N half of survey ..... T. D. 200 ft.; shut down.
Pat Armstrong's No. 1 Crawford, 1,389 ft. N line, 2,550 ft. E line of survey, 487.6 miles W of Devine ..... T. D. 2,395 ft.; drlg.
Lyuko Co.'s No. 1 Medina Valley Irrigation, 2,800 ft. to S line, 2,250 ft. to E line of E. Reisacher Sur. No. 509. T. D. 686 ft.; drlg. lime.
United North & South Dev. Co.'s No. 1 Little, S from D'Hanis and near S line of county ..... T. D. 2,578 ft.; drlg. Cagle Ford.

Service Oil & Gas Co.'s No. 1 H. G. Henslee, 500 ft. from NW line, 400 ft. from NE line of 50-ac. tract, Valdez Sur. ....Location.

MILAM COUNTY

Rheubotham & Tate's No. 1 Johnson, 325 ft. from N line, 250 ft. from W line of 40-ac. tract, D. Robinson Sur. ....Derrick.

NUECES COUNTY

Independent Oil & Gas Co.'s No. 1 Baldwin, 330 ft. each way out of NE of the J. C. Russell Subd., Blk. 11, 3 miles W from Corpus Christi ....T. D. 5,226 ft.; reaming.
Houston Oil Co.'s No. 1 Comstock, 105 ft. N of C of tract ..Laying water line.
H. H. Weinert et al's No. 1 Mohle, 450 ft. S line, 450 ft. W line of Section 94 ....Location.

REAL COUNTY

McGinley Corp.'s No. 1 Haby, C of SW Sec. 175 ....Spudded.

SAN PATRICIO COUNTY

Magnolia Pet. Co.'s No. 1 Freeman, 660 ft. S and W lines of NW half of 80-ac. tract, Sec. 57 in the E. J. McGloin Sur. ....T. D. 5,526 ft.; rigged up to deepen.
J. L. Kennedy's No. 1 McRae, 1,170 ft. NW of the C of the SE line of 500-ac. tract ....Drlg. water well.
George B. Pickett's No. 1 Baldwin, 900 varas due E of Denton, 1,200 ft. S of the SE cor. of O'Neil Sur., Abstract 211 ....T. D. 4,012 ft.; moving in heavy rig to go 6,000 ft.
Saxet Oil Co.'s No. 1 Carroll, 800 ft. N line, 130 ft. to W line, Lot 32-A, Sec. 32 of the fourth subd., Taft farms ....Moving in tools.
Union Prod. Co.'s No. 4 Welder, 3,000 ft. N line, 4,500 ft. E line of tract in the E. Portillo Sur. ....T. D. 4,033 ft.; drlg.
G. B. Peterman et al's No. 1 Crow, 150, ft. from S line, 170 ft. from W line of Sec. 24 of the Fulton-Coleman Pasture Lands, J. H. Paul Subd. ....T. D. 2,872 ft.; shut down.
G. B. Peterman et al's No. 1 Foster, 150 ft. from E line, 1,420 ft. from N line of Blk. 5 of the Welder-Coleman-Fulton Subd., 3½ miles W from Sinton ....Location.
LaFeria Oil & Gas Co.'s No. 1 C. C. Smith, in J. C. White Sur., 690 ft. to N line, 350 ft. to E line ....T. D. 4,067 ft.; shut down.
Cosden Oil Co.'s No. 1 Powell, 330 ft. E line of 36-ac. tract in Section 32, Paul Subd., Colman-Fulton Pasture Lands ....Location.

STARR COUNTY

Kush Expltn. Co.'s No. 1 Kelsey-Bass, 150 ft. to W line, 750 ft. to N line, Por. 75, Blk. 9 ....T. D. 610 ft.; drlg.
J. L. Smith's No. 1 Welch, Perdernal Sur. ....T. D. 940 ft.; drlg.
Virginia Oil Co.'s No. 1 Kelsey-Bass, 150 ft. to S line, 1,850 ft. to W line, Blk. 6, Por. 75, Courargo ....T. D. 230 ft.; drlg.

TRAVIS COUNTY

Fox Oil Co.'s No. 1 W. Fuchs ....T. D. 1,012 ft.; shut down.
Fort Bend Oil Co.'s No. 1 M. Engleman, 450 ft. N line, 150 ft. W line of 103-ac. tract, J. H. Denson Sur. ....T. D. 385 ft.; shut down.
Garfield Oil Corp.'s No. 1 Gentry, on Travis-Bastrop line ....Location.

UVALDE COUNTY

E. Anglin et al's No. 1 U.P.P., 1,550 ft. from NW line, 7,450 ft. to NE line of Manual Leal Sur., 10 miles SE from Uvalde ....T. D. 1,200 ft.; abandoned, dry.
Waldrop & Welch's No. 1 E. R. Edmonds, 1,750 ft. NW, 7,200 ft. W of Sec. 71, in the A. Gomez Sur., 8 miles S of Uvalde ....T. D. 1,193 ft.; moving in heavier rig.
Phantom Oil Co.'s No. 1 Claudt, Sec. 611 ....T. D. 2,625 ft.; drlg. shale.

VICTORIA COUNTY

The Texas Co.'s No. 1 A. M. McFadden, 1,550 ft. N and E lines of H. Bonny Sur. ....T. D. 4,700 ft.; drlg.

WEBB COUNTY

J. L. Elliott's No. 1 Esperanza Land & Stock Co., 950 ft. from N line, 2,231 ft. E line, Sur. 815 ....T. D. 1,450 ft.; standing.

WILLIAMSON COUNTY

Texas Oil & Gas Development Co.'s No. 1 Gervert & Allison, 9 miles NE from Taylor ....T. D. 40 ft.; shut down.

ZAPATA COUNTY

T. H. Ward's No. 1 Uribe, 150 ft. NW line, 150 ft. SW line, Blk. 8 Subd., Share 7, Partition No. 6, T. Uribe Partition of Jose V. Borrego Sur. ....Rigging up.
B. F. Nixon's No. 1 A. Gutierrez, 170 ft. S line, 332 ft. E line, Lot 5, Blk. 8, Partition 10, Borrego grant ..T. D. 50 ft.; standing.
Penny Prod. Co.'s No. 1 Juan V. Cuellar, Jr., et al, 175 ft. NE line, 175 ft. SE line Poppas Subd., Porcion 33 and 34, Blk. 1, Sur. 2 ....T. D. 950 ft.; drlg.
National Oil Co.'s No. 1-A Adams, 150 ft. N of No. 1, Blk. 4, Sec. 11, Adams Subd., Borrego grant ....T. D. 690 ft. (corrected) running tubing.
National Oil Co. of Delaware's No. 1 Luther, 617 ft. NW line, 96 ft. NE line, Blk. 97, Da Prom Subd., Porcion 6 ....T. D. 380 ft.; drlg.
National Oil Co. of Delaware's No. 2 Luther, 64 ft. NE line, 272 ft. SE line, Blk. 13, Sur. No. 7, Share 8, Borrego grant ....T. D. 696 ft.; show gas.
Mackinzie and Tallmadge's No. 1 Trevino, 400 ft. SE line, 200 ft. NE line, Blk. 6, Sur. No. 4, Porcion 2 and 3 ....T. D. 30 ft.; standing.
F. M. Blair & Son's No. 1 Gutierrez, 150 ft. from NW line, 660 ft. from SW line, Blk. 2, Blair Subd., Comitas grant ....T. D. 1,392 ft.; testing.
Lincoln Oil & Gas Co.'s No. 1 Gutierres, Blk. 23, Subd., La Huerta grant ....T. D. 725 ft.; drlg.

ZAVALA COUNTY

Krebs & Davis' No. 1 Weatherby, E center of NW of Sec. 44, Blk. A, Adams, Beatty & Mouton Sur., 4 miles E from Loma Vista ....T. D. 1,802 ft.; standing.
Ed Anglin's No. 5 Pryor ....T. D. 1,034 ft.; drlg.
Texas Gas Utilities Co.'s No. 1 Ike T. Pryor, Jr. ....T. D. 1,211 ft.; tested gas, estimated 20,000,000 ft.
Ed Anglin's No. 6 La Pryor ....Location.

PETROLEUM BOOKLETS FOR SERVICE STATIONS

Publication of new booklets, "Petroleum for Lubrication" and "Uses of Petroleum Products," completes the 12-volume "Oil Industry Series" published this year by the American Petroleum Institute. The series provides for the layman a nontechnical, complete and interesting account of the petroleum industry's birth, development and service.

The booklets are illustrated with line drawings, and are of convenient pocket size, 5"x7". Each has 16 pages. Provision is made for the imprinting of company names and addresses and the make-up generally is such as to permit economy and ease of mailing. The booklets are available separately or in sets at cost of printing.

The titles and numbers of the booklets in the "Oil Industry Series" follow: No. 1—What Is Petroleum? No. 2—Petroleum in Legend, in History, and Today; No. 3—Petroleum a World Industry; No. 4—The Oil Industry of the United States; No. 5—Conservation of Petroleum; No. 6—How Oil Is Found and Produced; No. 7—How Crude Oil Is Transported and Stored; No. 8—How Petroleum Is Refined; No. 9—Gasoline—Thirty Questions Answered; No. 10—Petroleum From Well to Market; No. 11—Petroleum for Lubrication; No. 12—Uses of Petroleum Products.

MEXICAN SEABOARD MOVES

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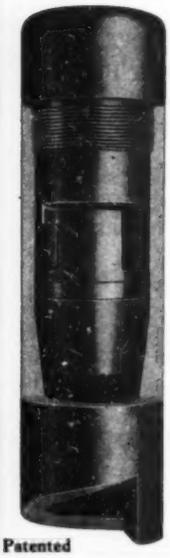

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WRIST PIN
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Will help improve standard rig pumping by cutting operating expense, thereby increasing net profits.

As shown at the right the pin has a tapered shank, over which fits a steel split bushing, tapered in the opposite direction, the two tapers dovetailing and forming a straight shank on the wrist pin, the size of the hole in the crank.

It has two left-hand threaded nuts, one on the small end and the other on the large part. The nuts form the shoulders of the pin and the revolutions of the crank loosen the rear nut and tighten the end nut, thereby taking up wear.

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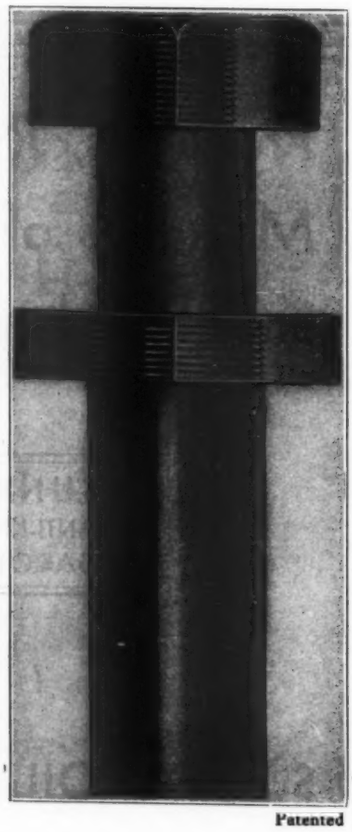

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A.P.I. DIRECTORATE PLACES TO BE FILLED

Directors of the American Petroleum Institute whose terms expire this year and whose places will be filled at the annual convention in Chicago in November are:

Pacific Coast (Production) Group: W. M. Keck, Superior Oil Co., Los Angeles; L. P. St. Clair, Union Oil Co. of California, Los Angeles; and Oscar Sutro, Standard Oil Co. of California, Los Angeles. Central United States (Production) Group: W. S. Farish, Humble Oil & Refining Co., Houston. Eastern United States (Production) Group: Axtell J. Byles, Tide Water Associated Oil Co., New York. Pacific Coast (Manufacturing) Group: H. R. Gallagher, Shell Co. of California, San Francisco. Central United States (Manufacturing) Group: Roy B. Jones, Panhandle Producing & Refining Co., Wichita Falls. Eastern United States (Manufacturing) Group: Frank B. Fretter, National Refining Co., Cleveland; G. R. Nutty, Gulf Refining Co., Pittsburgh; and W. E. Smith, Standard Oil Co. of Kentucky, Louisville. Pacific Coast (Distribution) Group: K. R. Kingsbury, Standard Oil Co. of California, San Francisco. Central United States (Distribution) Group: L. L. Marcell, White Eagle Oil & Refining Co., Kansas City: and R. W. Stewart, Chicago. Eastern United States (Distribution) Group: Amos L. Beaty, Transcontinental Oil Co., New York. Transportation (Ships) Group: J. Howard Pew, Sun Oil Co., Philadelphia. Pipe Lines: C. H. Kountz, Prairie Pipe Line Co., Independence. Supply Group: J. S. Carroll, Johns-Manville, Inc., New York. Foreign Trade Group: W. C. Teagle, Standard Oil Co. of New Jersey, New York. "At Large" Group: C. B. Ames, The Texas Company, New York; Jacob France, Mid-Continent Petroleum Corp., Tulsa; Wirt Franklin, Wirt Franklin Petroleum Corp., Ardmore; S. A. Guiberson, Jr., Guiberson Oil Investment Co., Los Angeles; William F. Humphrey, Associated Oil Co., San Francisco; D. J. Moran, Continental Oil Co., Ponca City; Waite Phillips, Independent Oil & Gas Co., Tulsa; F. B. Parriott, Transcontinental Oil Co., Tulsa, and W. G. Skelly, Skelly Oil Co., Tulsa. Directors at large elected by the board: Taylor Allderdice, Pittsburgh Screw & Bolt Co., Pittsburgh; E. R. Brown, Magnolia Petroleum Co., Dallas; Henry M. Dawes, the Pure Oil Co., Chicago; J. C. Van-Eck, Shell Union Oil Corp., New York, and George P. Whaley, Vacuum Oil Co., New York.

RINEHART BOOTH AT OIL SHOW

Representatives of Ira Rinehart's Oil Report will be at Booth 21 in the California Building, International Petroleum Exposition to offer information on the service given by the organization. Two reports are published daily, one in Tulsa, covering principally Oklahoma and Kansas, and the other in Fort Worth, Tex., covering the operations of Texas and New Mexico. The high spots for the country at large are cited daily in both reports. The reports are issued in the form of a private letter.

CARL C. MacFADDEN DROWNED

NEW YORK, Sept. 29.—Carl C. MacFadden, aged 30, familiarly known as "Carlito" MacFadden to his many friends in the South American petroleum circles, nephew of C. K. MacFadden of New York, was drowned September 19 while surf swimming at Daytona Beach, Fla.

COONTZ-WORTHINGTON

Miss Lura Coontz, assistant librarian in the technical department of the Tulsa Public Library, and Edward Worthington, with the Frick-Reid Supply Corp., Tulsa, were married at Lawton, Okla., on Sunday, September 28. After a short honeymoon trip they will make their home in Tulsa.

CONTROLLED STATIONS DO NOT SATISFY NEEDS

(Continued from Page 368)

care-free economical miles, it must have intelligent care. That is why he is turning definitely toward regular lubrication and inspection; why he is showing a steadily increasing preference for high quality, advertised merchandise.

And this much can certainly be said with assurance. The smooth-running, easy-handling car of today permits its owner to buy where he pleases—and he does. A certain number of people can be trapped by convenience and other features, but in the last analysis, John Public's opinion is the answer and always will be.

Public's Attitude

John Public has not been sold high-class brands through advertising. His good automobile, good roads, touring at high speed—all these have forced him to be interested in efficiency, reliability and economy. He knows he needs good oil, regular lubrication and inspection to maintain them. He merely uses advertising as a guide to select the best supplies for his car. He thinks a service station should be a place where he can go and buy gasoline, oil, tires, spark plugs—everything for his car—and make his own selection between several brands of each. He has always said of clothing, hardware, or jewelry stores, "I don't trade with the Jones Co. I go to Smith's. He has a better selection." And now he is beginning to take this way about service stations.

For example, it is generally conceded that 50 motorists out of 100 will do business elsewhere if a service station discontinues handling their favorite brand of gasoline. They feel even stronger about lubricating oil because statistics show that 68 out of 100 will change dealers if they can no longer get the brand of oil they have been using.

In the long run, the public gets what it wants. Thumb the pages of history for the last 15 years and note the kings, statesmen, politicians and clear on down to theatrical producers and oil companies—they have all found this out to their cost. The public does not make up its mind quickly but once it has decided, woe betide any man, company or industry which gets in its road and tries to force it into another channel or turn it aside from its objective.

For this reason alone—and there are many others—the controlled station, that is, the station handling the products of one marketer exclusively cannot hope to be successful from the standpoints of profitable operation and increased volume. The public has long since decided definitely that it will not support that kind of business. It will go to an exclusive agency to make a big annual purchase like an automobile or a radio, but even then it shops around. But, when it comes to small purchases or materials frequently bought, it prefers to trade where it can pick and choose between several brands or makes of the same article. And this is especially true where several different articles are often bought at the same time.

Customers' Demands

For example, how far could a cigar stand get handling only Lucky Strikes, Cremo cigars, Prince Albert and Battle Axe? What grocer would dream of trying to hold his trade exclusively on Del Monte canned goods, Maxwell House coffee and Log Cabin syrup? What druggist would consider any salesman's offer that he might have an extra discount if he would throw out all shaving creams but Palmolive and all tooth pastes but Pebeco? And, we finally ask, what oil company executive in charge of developing a chain of controlled stations would patronize any cigar store, grocer, or druggist who sold only single brands of merchandise, good though they all are?

A year ago, the president and builder of a nation-wide chain of restaurants decided his customers were eating too much meat. He had become a vegetarian and thought they ought to be eating more spinach and turnips. He began putting

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Have a Gott supply of clean-pure sparkling water... ready to drink at all times. No matter where you are the GOTT Water Can is health insurance. Your supply store has them.
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A GOOD INVESTMENT

$6.00 expended by you for a subscription to The Oil and Gas Journal entitles you to 52 copies of a weekly oil publication that contains complete and accurate information on all activities of the petroleum industry.

out menus that would make a rabbit's mouth water and a dog stop hanging around the kitchen door. Recently, the stockholders elected a new president on the platform that he would put some beef into the business again.

Not long ago, a big Chicago hotel smugly notified guests that no more ginger ale would be served in its room. Within two weeks a 30 per cent fall-off in business told the management that the traveling public thought more of its regular habits than it did of their hotel.

If the public has thus indicated many times over its distinct preference for dealers who offer it a good selection of merchandise, how can the service station handling but one marketer's products become successful? The growth of the independent superservice station shows plainly that the public has decided its automotive supply store belongs in the same general class as its grocer, druggist and other retail merchants. Refusal to recognize this trend in the public's buying habits simply means trouble and eventual failure for anyone so stubborn or blind as to oppose them.

There is always a place in any line of business for the independent dealer. He endears himself to the public by giving the public what it wants. This is entirely aside from his advantage of being the little fellow against the big fellow. In the oil business, this is particularly true. The funny part of it is that the big marketers really recognize this when they subsidize an independent dealer to get him to handle their products exclusively. They tacitly, silently admit he is going to lose some business. Otherwise, it would not be necessary to give him a longer profit on their line to make up the loss.

Controlled Station

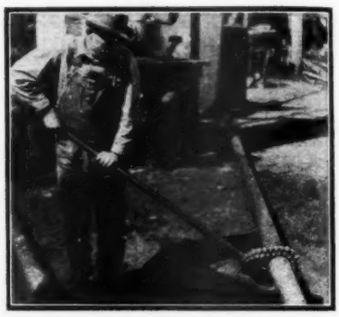
The controlled station plan is a costly substitute for good merchandising. It costs the marketer longer discounts than he has to give the strictly independent dealer. Yet he does not better his own position, because, while he is shutting his competitors out of his particular controlled station, they, in turn, are barring his products from stations they control in the same way. From the standpoint of outlets, he winds up right where he started and he makes less profit.

The controlled station plan is a poor one from the dealer's angle also. It is only a matter of simple arithmetic to prove that the business will lose on popular brand dealers he can no longer carry, and will cost him a lot more money than he can possibly get from the extra "gas" discount. In fact, when his direct and indirect losses are added up, it is found that the subsidy he receives from the controlling marketer, as a general rule, will not take care of more than half of these losses. So he, as well as the marketer, is out of pocket. The only one who gains from the deal is the independent dealer down the street who picks up the controlled dealer's former customers on nationally advertised, high quality brands when the controlled dealer can no longer supply them.

So, to Bill Jones' question, "Why does my business fall off under the 100 per cent arrangement?" there is apparently a definite, readily understandable answer. Opposing the desires and buying habits of the public has always resulted in costly failures in the past. There is no reason to assume that the controlled station idea is any different in principle from many others on which the public, after a reasonable trial, has voted "thumbs down." It will eventually take its place among the "wrong guesses" in the history of the oil business. And then, as now, the independent operator will go right on flourishing—and taking business away from the big fellow.

An additional comparison that further illustrates this thought is given in the following observation. A detailed description of the Atlantic & Pacific Tea Co., the largest chain organization in the world, was given in the July issue of the magazine "Fortune." In their subsidiary companies, the American Coffee Co., Atlantic Commission Co., and the Quaker Maid Co., they have an enormous quantity of their own branded goods, yet two-

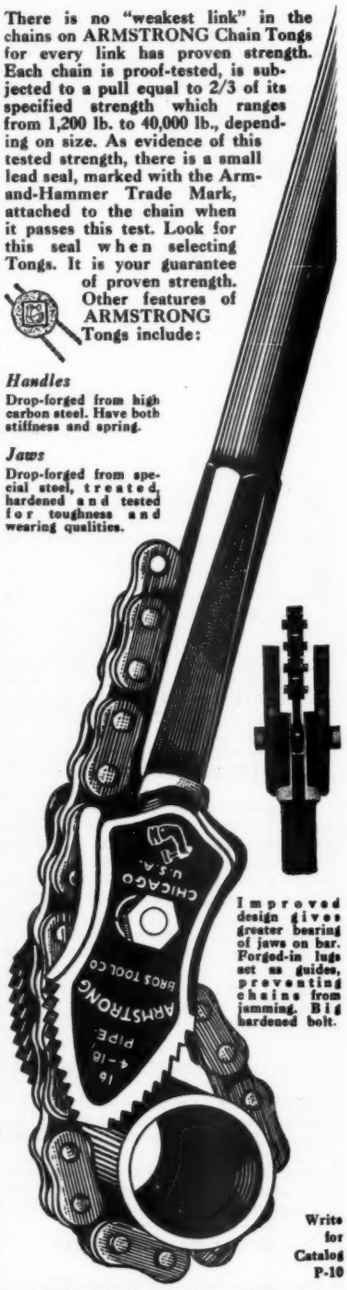
ARMSTRONG
Chain Pipe Tongs



There is no "weakest link" in the chains on ARMSTRONG Chain Tongs for every link has proven strength. Each chain is proof-tested, is subjected to a pull equal to 2/3 of its specified strength which ranges from 1,200 lb. to 40,000 lb., depending on size. As evidence of this tested strength, there is a small lead seal, marked with the Arm-and-Hammer Trade Mark, attached to the chain when it passes this test. Look for this seal when selecting Tongs. It is your guarantee of proven strength. Other features of ARMSTRONG Tongs include:

Handles
Drop-forged from high carbon steel. Have both stiffness and spring.

Jaws
Drop-forged from special steel, treated, hardened and tested for toughness and wearing qualities.

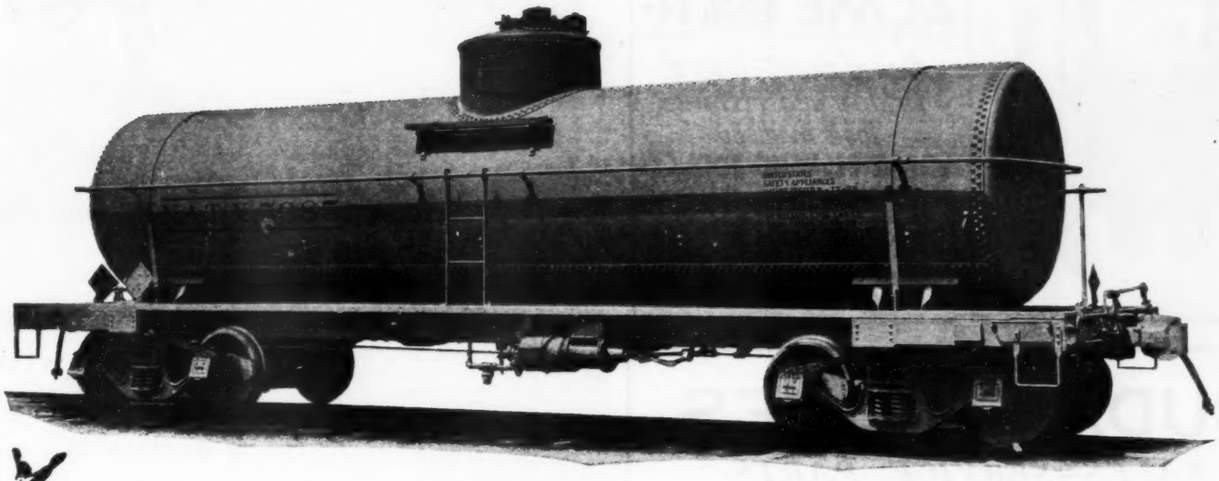


Improved design gives greater bearing of jaws on bar. Forged-in lugs act as guides, preventing chains from jamming. Big hardened bolt.

Write for Catalog P-10

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
330 N. Francisco Ave., CHICAGO, U. S. A.

TANK CARS OF ALL TYPES



COMPLETE FACILITIES FOR REPAIRING CARS

UNDERFRAMES - TRUCK FRAMES AND BOLSTERS - WHEELS

PRESSED STEEL CAR COMPANY

NEW YORK PITTSBURGH CHICAGO ST. LOUIS ST. PAUL

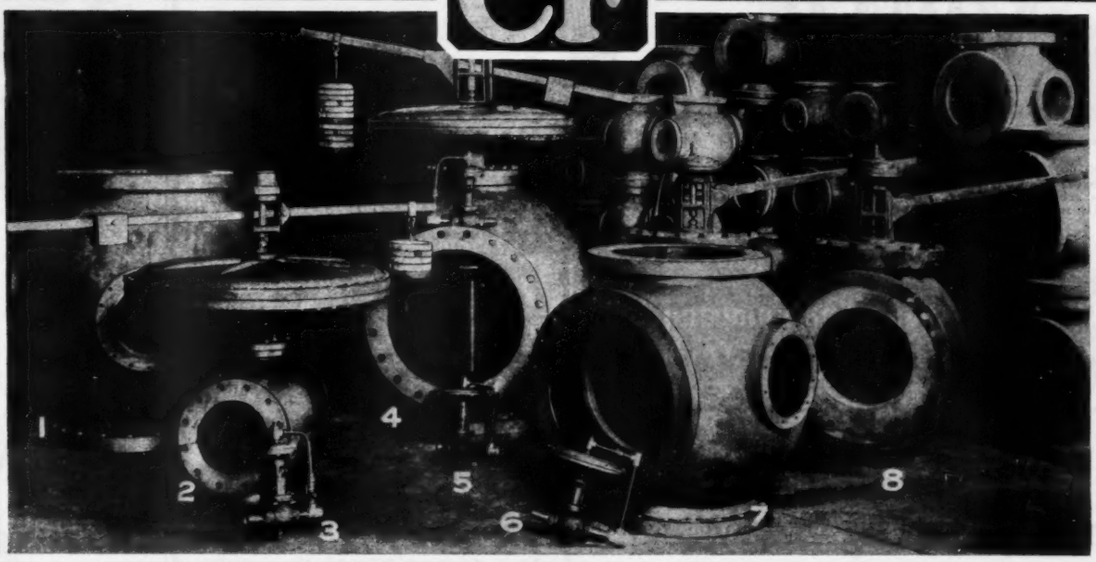
BIG ONES OR LITTLE ONES -A COMPLETE LINE OF DEPENDABLE CF

1 BODY FOR TWENTY-FOUR-INCH LOW PRESSURE REGULATOR.

2 A TEN-INCH DIFFERENTIAL REGULATOR.

3 A THREE-FOURTHS INCH HIGH PRESSURE REGULATOR.

4 TWENTY-FOUR-INCH DIFFERENTIAL REGULATOR FOR MIXING GASES.



5 ONE-INCH HOUSE REGULATOR.

6 ONE AND ONE-HALF INCH HOUSE REGULATOR.

7 BODY OF A TWENTY-INCH WEIGHTED ILLUMINATING REGULATOR.

8 A SIXTEEN-INCH HIGH PRESSURE REGULATOR.

REGULATORS

GREATER dependability and accuracy has been the Chaplin-Fulton goal for over forty years of experience in controlling gas pressure. Being today's standard is the result of ceaseless effort to improve design, materials, and workmanship.

During this time there have been developed many varying types of regulators—enough to meet every major requirement of gas control.

Chaplin-Fulton therefore represents a most complete and a highly dependable line of products. Catalogues are available which describe each Regulator.

The Chaplin-Fulton Mfg. Company

ORGANIZED 1884 — OLDEST BUILDERS OF GAS REGULATORS IN THE COUNTRY. BUILT IN ALL SIZES, FROM 1 INCH TO 24 INCHES; FOR ALL SERVICES, 1 OZ. UP TO 2,000 LBS. PRESSURE TO SQUARE INCH.

28-40 Penn Avenue Pittsburgh, Pa.

The simplest CLAMP with greatest grip!

ACME B·& R·

One of the 148 types of Drilling and Fishing Tools made by ACME FISHING TOOL CO· at Parkersburg W·Va·

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GURNEY BALL BEARING

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REG. TRADE MARK

Holzapfel's HEAT PROOF Protective

Two years exposure up to 1800 deg. Fahr. has not harmed VOLCO paint—it is absolutely incombustible!

Fusing at 400 degrees, VOLCO is thereafter impervious to heat, oil, water, gasoline or hydrocarbons. Recommended for stacks, boilers, furnaces or any steel surfaces subjected to intense heat. Prepared *ready-mixed* in Black and four colors. Covers 250 square feet per gallon.

Write for circulars, prices and test sample.

International Compositions Company Inc.

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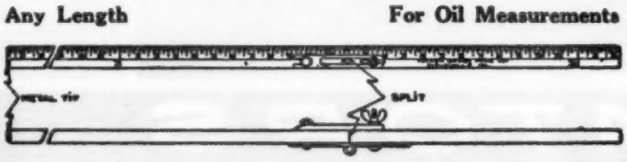
GAUGE POLES

Any Length For Oil Measurements



"MARSH-JOINT"

For sale by oil country supply houses or furnished promptly by the factory at Titusville, Pa.

Correspondence Solicited

MARSH GAUGE POLE COMPANY

TITUSVILLE, PA.

thirds of their shelf space is dedicated to competitive nationally advertised better known brands like Del Monte canned goods and Blue Ribbon mayonnaise.

If the largest chain organization in the world with over 50 years' experience behind it has found it profitable to handle national brands to this extent, must not large oil marketers come eventually to the same conclusion; namely, "He profits most who gives the public what it wants."

SUPPLEMENTAL LIST OF EXHIBITS

(Continued from Page 404)

pressure boiler feed line regulators, balanced valves, steam pump speed governors, hydraulic damper regulators, strainers, etc. William B. Moorer of the Moorlane Co. is in charge of the exhibit with F. A. Morrison, secretary of the company, is in attendance from the factory.

MACK TRUCK CO.
Lot E, Open-Air Space

The Mack Truck Co., Long Island, New York City, has on exhibition one of its latest model motor trucks.

MARSHALL SUPPLY CO.
56 Refiners and Marketers Building

The Marshall Supply Co., Tulsa, exhibits tentacular belts as manufactured by Alexander Brothers, Philadelphia, Pa., and transmission machinery, including Dodge Timken bearings as manufactured by the Dodge Manufacturing Corp.

In attendance at the booth are W. B. Marshall, Sr., W. B. Marshall, Jr., and A. D. Dunlap.

McALEAR MANUFACTURING CO.
39, 40, 65 and 66, California Building

The McAlear Manufacturing Co., 1901 South Western Avenue, Chicago, is exhibiting pressure and level control equipment. The exhibit is in charge of R. C. Flournoy, Jr., manager of the oil industry division, and W. P. Nedins, sales manager.

NORTHWEST ENGINEERING CO.
Lot N, Open-air Space

Northwest Engineering Co., 28 East Jackson Boulevard, Chicago, Ill., will exhibit one one-half cubic yard full revolving crawler pull shovel, equipped with Northwest-Wisconsin variable speed motor. Travel speed 1 to 4 miles per hour.

Those in attendance will include L. E. Houston, president; Watson Harmon, assistant general sales manager; Jack Wolff, district sales manager, and J. L. Tallman, district sales manager.

NORTH AMERICAN CAR CORP.
10 Refiners and Marketers Building

The North American Car Corp., 327 North LaSalle Street, Chicago, will be represented to meet the trade, its line consisting of the leasing of tank cars. Godfrey Brigham of Tulsa is in attendance.

NATIONAL TUBE CO.
24, 25, 26, 27, 28 and 29 Oklahoma Bldg.

The National Tube Co., Frick Building, Pittsburgh, Pa., is showing oil country tubular products, including long length National seamless line pipe, 10¾-inch outside diameter, 45 feet long; long length A.P.I. seamless special alloy drill pipe, 6⅝-inch outside diameter, 25.20-pound, 30 feet long; long length A.P.I. casing, 8⅝-inch outside diameter, 32-pound, 30 feet long; samples showing a cable tool string of A.P.I. casing, telescoped and windowed to show clearance; samples windowed to show joint of National Diamond BX and Diamond BS special alloy casing, A.P.I. drill pipe, special alloy drill pipe, A.P.I. oil well tubing, A.P.I. external upset tubing, slip joint line pipe, and cracking still tubes.

NICHOLSON CLOCK CO.
10 Scientific and Technical Building

The Nicholson Clock Co., Tulsa, is showing the McGaughy Integrator which is widely used by oil companies in the reading of meter charts. With this instrument, this work can be done in 55 seconds and is a great labor saver in the gas measurement departments of the oil

Old Timer Says—

"Can you clean out your well without removing your stuffing box casing head?

It's a simple matter with a PARMACO Combination Stuffing Box Casing Head."

Write for Catalog

PARKERSBURG MACHINE CO.

PARKERSBURG, W. VA.

The House of Courteous Service

PARMACO

B & B Line "spools pretty" on the cable tool rig of Magnolia Petroleum Company's Homsley No. 3, Earlsboro, Okla. Left: Jack Lee, Tool Dresser; right: R. S. Stanley, Driller.

"Just Naturally A Good Line"

Listen to R. S. Stanley, Driller, calling down Jack Lee, Tool Dresser, for saying they have good luck with their *B & B Cable Tool Drilling Lines:* "Good luck, your eye! It's just naturally a good *line.*"

Naturally it is. The wire is specially drawn and put through four very strict tests. It is laid up on machinery designed to impart to the rope that *springy* quality which makes drillers call it "the easiest handling line made—a mighty pretty spooling line that you can count on to drill ahead of the tools."

Distributors in all fields handle B & B Patentsteel, Extra Strong Cast Steel and Cast Steel *Cable Tool* Drilling Lines, Sand and Pumping Lines, and invincible Yellow Strand Rotary Lines.

Send for Catalog K-2

BRODERICK & BASCOM ROPE CO.
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Factories: St. Louis and Seattle *Warehouse:* Houston

BRODERICK & BASCOM DRILLING LINES

N 597

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We have just completed 150 miles of 24" line for Missouri Valley Pipe Line Company in Kansas, Oklahoma and Texas. Now building an additional 80 miles for same Company in Texas and Iowa.

We solicit inquiries on your pipe line requirements of any size.

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When you buy a Houston Ready-Cut or Sectional house or building you are purchasing, not just another structure, but years of specialization in this line of work which has led to the development of a better house, a more economical building and a finer housing service to the oil industry.

Carefully selected materials, more carefully constructed in a modern plant by modern methods are your guarantee of a strong, durable, and correctly designed building. We have a size and type for every need and purpose. Mess Halls, Bunk Houses, Cottages, Warehouses and other types used in the oil fields will be found in our Catalog.

Houston Ready-Cut and Sectional houses can be moved from location to location, with 95% salvage. In no other buildings will you get as much real satisfaction and economy.

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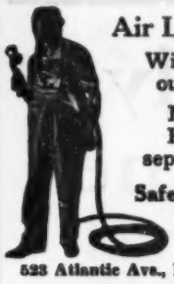
Successors to Crain Ready-Cut House Co.

HOUSTON, TEXAS



Air Line Mask

With or without Blower.

Mask and Blower in separate cases.

Safety Gas Main Stopper Co.

523 Atlantic Ave., Brooklyn, N. Y.

companies. In attendance at the booth are G. E. Nicholson, J. I. Webster and J. B. McGaughy.

NORVAL MOTOR CORP.
10 by 50, Open-Air Space

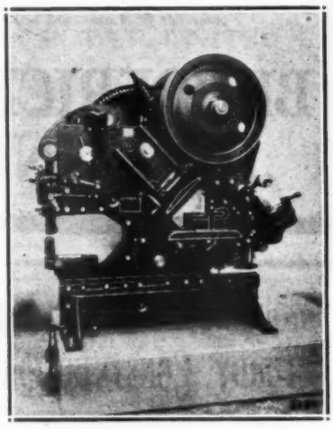
The Norval Motor Corp., Tulsa, exhibits the latest model Dodge truck.

OIL WELL SUPPLY CO.
68, 82 and 129 Texas Building

The Oil Well Supply Co., Oil City, Pa., maintains a reception booth but has no exhibit of equipment other than this. The booth is in charge of A. K. Herbert, and those attending will be B. F. Harris, president; D. J. Brown, vice president and general manager; A. J. Moorlang, vice president; E. E. Greve, engineer; R. C. Stamets, F. A. Kingery and P. D. Richey.

HENRY PELS & CO.
46, 47 Oklahoma Building

Featuring the exhibit of Henry Pels & Co., New York, is the Pels type MAE-16 quadruple combined punch, splitting shear, bar, angle and tee cutter, with built-in notcher. This machine, which has a steel plate frame, is virtually an iron-working shop in one machine. Two operators can work on the machine at the same time, one at the punching end and the other at the shearing end. The machine is suited to the steel fabricating operations incidental to the construction, maintenance and repair of petroleum re-



fineries and large industrial plants, tank cars, conveying equipment, etc., as well as commercial structural steel and iron-working plants. One 5-horsepower motor is ample for operating the machine which will shear 4½"x4½"x½" or 6"x4"x⅝" angles and tees, five-eighths inch plate, and punches 1 1/16-inch holes through five-eighths inch steel.

Type ME-10 quadruple combined punch, shear and coper is shown also. This is really a small edition of the MAE-16 machine, and has capacity for shearing 3"x3"x⅝" angles or tees, and will punch a 1-inch hole through three-eighths inch steel.

Both machines are demonstrated under power. G. W. Thorbahn is in attendance.

RESISTCOR ENGINEERING CORP.
Open-Air Space

The Resistcor Engineering Corp., Tulsa, Okla., is exhibiting a varied line of its well known goods.

Of its own manufacture it shows Resistcor pipe wrapping machine, Seminole pipe handling booms. Seminole front end winch, husky combination boom and winch for McCormick Deering tractors, Seminole ball bearing blocks, Sheehan line-up clamps, Seminole pipe hooks, belt slings, Samson oil field hoist, Champion truck winches for Ford and Chevrolet, Samson winches for Fordson tractor, Champion 1½-ton trailers, Samson rear winch and boom for Caterpillar 30 tractor.

Included in the display also, will be a McCormick-Deering tractor and trackson full crawler; Resistcor 75 horsepower truck winch for International six-speed truck; pipe wrapping machine, ball valve, tubing elevator and low down rolling rig all bearing the Resistcor trade name;

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Are the best sales agents. An organization especially equipped for this type of work. Also makers of dies, jigs, fixtures, and small turret lathe work.

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THE BEST LOW PRESSURE GAS BURNER

Can be installed in boilers of any size — from the largest to the smallest. Illustration shows an installation in a 125-h.p. 350-lb. working pressure oil well boiler.

Perfect combustion.

Keeps steam on 3 to 300 lbs. gas pressure.

Uses as little gas as any burner and keeps up steam.

Will not clog up with leaky fire box or flues.

No fire brick or target to heat.

No banking up around mud rim.

No screws or bolts.

Burners delivered and installed free of cost to any point in Oklahoma—at any time, day or night.

Fixed mixture and no adjusting.

Practically no noise —few parts.

Costs no more than other burners.

Low maintenance.

Easily and quickly installed.

Burner heads do not burn up.

Three wells drilled below 6,000 ft. at Oklahoma City with one burner—and still in perfect condition. We have not sold a customer a part replacement this year.

VOLCANO BURNER INC.

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The arrow points to one of the gills of the Byrne Revolving Ventilators. These slits keep it on an even keel while revolving and provide just the right amount of suction.

BYRNE

Revolving Ventilator built light, strong and compact as an airplane

The Byrne Stationary Ventilator. Note the size of the weather guard and its sturdy construction.

Over 15,000 Byrne Ventilators are in use, both revolving and stationary—the reason they do the work better.

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paint supplies, enamel and primer, coating canvases, coating rugs, steel wire brushes, picks and shovels and small hand tools suitable for pipe lines.

WEBER ENGINE CO.
Lot K, Open-air Space

In the exhibit of the Weber Engine Co., Kansas City, Mo., is its new 40 horsepower Type "5A", two-cycle, heavy-duty gas engine. This engine is similar in design to the line of gas engines it has been producing the past 14 years. The Type "5A" engine is heavier and more rugged than the Type "ND" engine and is designed to develop its rated brake horsepower at 180 r.p.m., although it has the same speed range and flexibility as the "ND" engine.

Type "B" two-cycle oil engine is rated 80 b.h.p. at 380 r.p.m. and intended for use in cable tool drilling, pumping and compressor stations, or power plants requiring heavy-duty engines with steady power impulse. The manufacturers stress its ability to operate smoothly at slow speeds.

A new device for gas engines being exhibited is a combination sand trap and volume tank and is installed in the intake line, and designed to eliminate home-made devices in use at a saving in expense. The tank is of welded steel construction, into which the gas is piped and deflected so that the heavy particles of sand and dirt are thrown into a liquid and prevented from passing on through the gas line.

NEW OIL EQUIPMENT INTRODUCED BY IDECO

(Continued from Page 147)

embodies important features and strength factors necessary for extra heavy duty in deep well drilling service. An especially designed main bearing with a safe load

Ideco Type B portable drilling rig.

capacity of 180 tons carries the downward load. A body thrust bearing of ample size absorbs the thrust of the body when the load is suddenly released from the bail. The bearing housing and cap form a large oil reservoir, providing constant lubrication to all bearings. A large fluid passage through the gooseneck and wash pipe reduces pressure and increases pump efficiency. All stuffing boxes are externally packed and are easily adjustable from the outside of the swivel.

Ideco 6-inch oil-bath swivel.

The bail is heavily constructed with ample clearance between bail and gooseneck. Two bail stops hold the bail in position. The lower stop prevents the bail from falling on the hose while the upper stop holds the bail in position when connecting or disconnecting the hose.

Heavily constructed trunnions, cast integrally with the housing carry the heavy loads with ease. Perfect alignment and equal distribution of the vertical load are obtained by means of a heavy duty bearing under the main bearing support.

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Oklahoma-Kansas and Eastern Pipe Line Report

OKLAHOMA-KANSAS

Pipe Line Runs for the Month of July, 1930

	Month bbls.	Daily average bbls.
Prairie P. L. Co.*	3,251,900	104,900
Gulf P. L. Co.	1,465,653	47,279
Texas P. L. Co.	752,631	24,278
Magnolia P. L. Co.	1,615,546	52,114
Empire P. L. Co.	1,986,685	64,087
Cosden P. L. Co.	570,196	18,393
Sinclair P. L. Co.*	3,069,000	99,000
Oklahoma P. L. Co.	3,203,013	103,291
Other lines*	5,657,096	182,516
Total July	21,571,630	695,858
Total June	23,520,370	784,012
Difference	1,948,740	88,154
Shipments		
Prairie P. L. Co.†	4,811,200	155,200
Gulf P. L. Co.	1,488,337	48,011
Texas P. L. Co.	1,535,288	49,525
Magnolia P. L. Co.	1,940,106	62,584
Empire P. L. Co.	2,037,306	65,720
Cosden P. L. Co.	480,901	15,513
Sinclair P. L. Co.†	3,312,208	106,845
Oklahoma P. L. Co.	3,336,757	107,637
Other lines*	4,650,000	150,000
Total July	23,592,103	761,035
Total June	25,430,161	847,672
Difference	1,838,058	86,637
Stocks		
Prairie O. & G. Co.*		37,112,000
Gulf P. L.-Gypsy Oil Co.		3,066,982
The Texas Company		4,415,839
Magnolia Petroleum Co.		6,549,846
Empire P. L. Co.		5,827,318
Mid-Continent Pet. Corp.		3,696,046
Sinclair Crude Oil Pur. Co.*		20,484,000
Oklahoma P. L. Co.*		3,101,774
Carter Oil Co.		9,569,730
Other lines		24,810,000
Total July		123,633,063
Total June		124,312,910
Difference		679,847

*Estimated. †Prairie and Sinclair shipments include Texas crude oil.

EASTERN PIPE LINE REPORT FOR MONTH OF AUGUST

Runs from Wells

In the following table will be found the regular receipts from wells by various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky, Illinois, Indiana and Michigan for July and August:

	July, 1930	Aug., 1930
Nat. Transit	339,640.44	118,378.49
S. W. Pa. P. L.	92,523.81	70,719.58
Eureka P. L.	356,585.89	272,439.56
Buckeye P. L. (Macksburg)	371,564.16	320,091.51
Buckeye P. L. (Cleveland)	10,605.56	11,270.77
Buckeye P. L. (Lima, etc.)	105,474.77	91,699.80
Indiana P. L.	4,832.54	3,933.81
Cumberland P. L.	190,812.45	169,133.16
N. Y. Transit	30,601.75	25,399.13
Tide Water P. L.	31,075.50	26,087.89
Pure Oil	266,204.65	255,892.02
Paragon Dev.	12,241.51	
Stoll Oil Ref.	3,568.69	3,500.15
Bradford Trans.	340,930.40	314,490.88
Total	2,156,562.15	1,683,036.75
Daily average	69,921.36	54,291.51

Note—Indian Refining Co. had other receipts of 371,343.40 bbls.

Petroleum Deliveries

The following tables exhibit the shipments or regular deliveries of various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for July and August:

	July, 1930	Aug., 1930
Nat. Transit	446,349.71	479,192.75
S. W. Pa. P. L.	259,734.68	280,390.24
Eureka P. L.	265,118.12	273,684.53
Buckeye P. L. (Macksburg)	205,283.26	160,065.90
Buckeye P. L. (Cleveland)	2,195.10	1,713.66
Buckeye P. L. (Lima, etc.)	1,297,607.97	1,394,277.59
Indiana P. L.	1,364,012.03	1,336,998.08
Cumberland P. L.	254,880.86	205,045.71
Southern P. L.	68,841.69	69,211.54
N. Y. Transit	171,500.30	172,930.08
Northern P. L.	182,471.98	125,321.25
Tide Water P. L.	340,105.72	504,721.54
Pure Oil	114,748.17	107,492.59
Paragon Ref.	114,435.64	
Indian Ref.	393,575.63	375,829.22
Paragon Dev.	12,103.82	
Bradford Trans.	460,403.94	381,474.90
Tuscarora Oil	466,572.46	503,354.86
Total	6,419,941.08	6,370,704.44
Daily average	207,094.88	205,506.59

Gross Stocks

The gross stocks held by various pipe lines in the oil producing sections of New York, Pennsylvania, West Virginia, Ohio, Indiana and Kentucky at the close of July and August:

	July, 1930	Aug., 1930
Nat. Transit	825,073.45	808,225.58
S. W. Pa. P. L.	480,083.44	490,366.60
Eureka P. L.	1,707,911.42	1,603,479.15
Buckeye P. L. (Macksburg)	750,760.45	694,516.87
Buckeye P. L. (Cleveland)	63,047.96	66,815.01
Buckeye P. L. (Lima, etc.)	5,030,489.35	5,004,621.10
Indiana P. L.	771,951.56	836,606.05
Cumberland P. L.	585,644.30	547,844.28
Southern P. L.	311,660.33	245,676.27
N. Y. Transit	152,450.75	144,696.68
Northern P. L.	338,838.05	416,121.94
Tide Water P. L.	1,193,758.34	1,043,300.56
Pure Oil	349,233.02	507,198.43
Paragon Ref.	20,150.83	
Indian Ref.	165,643.89	161,817.52
Paragon Dev.	5,345.17	
Tuscarora	278,810.90	278,425.17
Bradford Trans.	237,709.63	197,440.63
Total	13,268,562.84	13,047,051.84
Decrease	128,292.62	221,511.00

Grades of Oil

The following table shows the amount of the different grades of oil held by the eastern pipe lines at the close of July and August showing gross stocks of the above fields:

	July, 1930	Aug., 1930
Pennsylvania	4,409,262.91	4,044,608.48
Lima	786,701.50	815,257.62
Kentucky	719,649.49	594,501.57
Mid-Continent	6,947,051.84	7,051,195.35
Illinois	67,354.68	44,760.06
Michigan	338,542.42	496,728.56
Total	13,268,562.84	13,047,051.84

Daily Average Runs

The following table shows the daily average runs of the Pennsylvania, Lima and Kentucky oil fields for the past four years:

	1927	1928	1929	1930
January	56,209	52,804	51,749	75,907
February	61,298	57,007	51,833	79,256
March	63,247	57,485	54,252	76,688
April	60,927	56,812	53,444	84,536
May	60,284	62,067	59,902	80,548
June	62,757	58,230	58,833	75,430
July	58,674	57,144	66,087	68,921
August	60,870	57,745	66,087	54,291
September	60,285	53,487	67,315	.....
October	147,080	58,100	76,093	.....
November	57,275	53,865	74,831	.....
December	53,089	52,025	74,561	.....

Daily Average Shipments

The following table gives daily average shipments from the Pennsylvania, Lima and other fields for the past four years:

	1927	1928	1929	1930
January	141,227	146,465	165,721	217,623
February	138,534	167,368	159,387	224,355
March	133,777	158,883	161,474	228,846
April	140,228	172,985	169,737	248,845
May	144,594	180,559	184,281	248,383
June	149,772	188,024	185,404	224,401
July	151,850	189,470	194,763	207,094
August	188,653	192,853	184,946	205,506
September	144,213	194,138	201,214	....
October	147,036	176,000	191,367	.....
November	150,975	176,898	202,743	.....
December	144,504	173,572	186,257	.....

Gross Stocks

In the following table will be found the gross stocks of the various lines of the Pennsylvania, Lima and Kentucky oil fields, including oil received from other lines at the close of each month for the past three years:

	1928	1929	1930
January	12,276,710	7,596,564	12,220,045
February	12,180,419	8,738,835	12,991,561
March	12,239,725	9,002,058	13,247,217
April	11,740,125	8,978,172	13,233,961
May	11,602,468	8,903,560	13,052,953
June	11,287,678	8,921,275	13,396,856
July	10,819,331	9,211,595	13,268,562
August	10,236,743	9,440,643	13,047,051
September	9,660,910	9,443,067	.....
October	9,229,709	9,441,101	.....
November	8,366,553	9,368,538	.....
December	7,539,555	11,253,953	.....

The Illinois Field

The following table gives the report of the Illinois Pipe Line Co. in Illinois:

Gross stocks, August 31	2,004,602.12
Runs from wells	568,554.24
Other receipts	151,451.54
Regular deliveries	319,777.19
Other deliveries	455,555.58

The amount of Illinois oil run by the Tide Water Pipe Co. in August was 26,087.89 bbls. Deliveries were 55,965.24 bbls. Adding these figures to those of the Illinois Pipe Line Co. makes the runs and deliveries as follows:

1930—	Runs	Deliveries
August	594,642.12	375,742.43
1929—		
February	517,320.17	503,387.70
March	728,319.67	586,049.60
April	515,374.27	654,297.96
May	608,981.60	673,812.83
June	568,454.70	818,845.97
July	611,106.79	828,159.44
August	625,351.99	746,425.06
September	582,457.66	669,947.72
October	622,302.83	558,558.68
November	565,108.75	427,064.63
December	548,924.41	489,368.81
1930—		
January	543,387.95	498,293.93
February	548,416.33	414,536.59
March	631,944.49	469,119.53
April	530,074.22	509,304.60
May	695,147.37	504,069.84
June	572,662.57	468,658.81
July	604,529.54	388,454.47

Tide Water Pipe Co., Ltd., also delivered in August 175,346.18 bbls. Oklahoma oil.

AVERAGE DAILY RECEIPTS OF CALIFORNIA CRUDE AND REFINED OIL AT ATLANTIC AND GULF PORTS

Average barrels per day in 1929-30—	ATLANTIC PORTS Baltimore	Boston	New York	Philadelphia	Others	Total	GULF COAST PORTS Galveston	New Orleans Baton Rouge	Port Arthur Sabine Pass	Tampa	Total	Total all ports
August	20,389	3,129	35,226	18,903	5,548	83,194	.....	.....	.....	.....	12,161	95,355
September	19,433	.....	31,834	11,900	6,200	69,367	.....	.....	.....	.....	4,800	74,167
October	9,065	4,677	42,065	12,000	9,677	77,484	.....	.....	.....	.....	4,097	81,581
November	18,900	3,167	41,667	14,699	3,767	82,200	.....	.....	.....	.....	2,400	84,600
December	12,968	.....	46,129	13,613	7,225	79,935	.....	.....	.....	.....	2,335	82,290
January	18,484	1,936	34,257	22,323	9,516	86,516	.....	.....	.....	.....	2,258	88,774
February	7,678	.....	24,714	14,321	5,000	51,714	.....	.....	.....	.....	2,607	54,321
March	19,548	3,065	26,871	8,774	22,484	73,742	.....	.....	.....	.....	805	74,548
April	7,767	.....	14,369	11,600	7,433	41,167	.....	.....	.....	.....	7,600	48,767
May	5,194	3,451	28,161	9,484	2,774	54,064	.....	.....	.....	.....	774	54,838
June	8,300	.....	33,933	20,767	2,333	65,333	.....	.....	.....	.....	2,400	67,733
July	17,355	7,774	43,419	23,839	6,452	98,839	.....	.....	.....	.....	4,645	103,484

AVERAGE DAILY IMPORTS OF CRUDE AND REFINED OIL AT PRINCIPAL UNITED STATES PORTS

Average barrels per day in 1929-30—	ATLANTIC PORTS Baltimore	Boston	New York	Philadelphia	Others	Total	GULF COAST PORTS Galveston	New Orleans Baton Rouge	Port Arthur Sabine Pass	Tampa	Total	Total all ports
August	33,387	14,355	162,644	30,936	20,355	261,677	4,226	12,742	.....	1,484	18,452	280,129
September	32,967	9,000	136,632	54,300	32,906	265,800	6,900	22,900	5,367	1,333	36,500	302,300
October	39,936	10,519	137,096	38,160	38,644	264,355	6,613	13,388	11,064	4,419	35,484	299,839
November	23,633	18,900	125,200	41,100	28,200	237,033	2,233	12,533	6,667	2,500	23,933	260,966
December	29,774	15,387	133,742	31,000	23,775	233,678	5,548	16,484	6,613	1,774	30,419	264,097
January	21,161	10,678	134,581	38,677	43,806	248,903	4,322	6,453	.....	548	11,323	260,226
February	24,500	14,714	147,357	36,036	39,786	262,393	2,821	11,072	3,500	1,964	19,357	281,750
March	28,355	3,839	151,806	36,645	34,903	255,548	4,323	11,645	839	2,419	19,226	274,774
April	31,400	8,933	123,500	40,433	19,434	223,700	.....	7,400	2,433	4,167	14,000	237,700
May	24,129	9,322	174,194	39,291	28,226	275,161	8,194	11,548	2,935	1,323	24,000	299,161
June	51,533	15,667	121,067	45,033	25,033	258,333	4,413	17,367	2,167	1,333	25,300	283,663
July	42,097	9,548	154,968	37,935	36,032	280,580	5,678	9,161	2,097	2,387	19,323	299,903

GROSS PRODUCTION OF CRUDE OIL IN THE UNITED STATES FOR 12 MONTHS

(In Barrels of 42 Gallons)

1929-30—		California	Oklahoma	Texas	Kansas	Arkansas	Louisiana	Rocky Mts.	Eastern	Total
September:	Month	26,104,264	21,299,490	36,067,065	3,780,690	1,959,720	1,718,250	2,347,020	4,075,000	97,351,499
	Daily average	870,142	709,983	868,902	126,023	65,324	57,275	78,234	135,917	3,244,716
October:	Month	26,895,160	20,831,646	36,412,167	3,429,468	2,000,027	1,956,326	2,392,952	4,482,000	98,389,746
	Daily average	867,586	671,666	852,004	110,628	64,517	63,107	77,192	141,358	3,251,282
November:	Month	21,317,540	19,193,760	24,896,034	3,430,560	1,911,060	1,853,565	2,350,110	4,029,000	78,981,629
	Daily average	710,585	639,793	829,868	114,352	63,702	61,785	78,337	134,300	2,632,720
December:	Month	21,705,554	20,093,876	25,609,823	3,549,066	1,917,071	1,878,352	2,378,754	4,168,100	81,299,596
	Daily average	700,179	648,156	818,394	114,486	61,841	60,592	76,734	134,455	2,622,568
January:	Month	21,983,242	20,802,984	25,284,352	3,273,197	1,817,685	1,780,969	2,151,090	4,216,000	81,309,519
	Daily average	709,137	671,064	815,624	105,587	58,635	57,451	69,390	136,000	2,622,888
February:	Month	20,885,660	17,977,624	23,314,637	2,965,704	1,608,376	1,738,425	2,027,984	3,780,000	74,298,410
	Daily average	745,916	642,058	832,668	105,918	57,442	62,087	72,429	135,000	2,653,517
March:	Month	19,699,979	19,112,306	25,503,880	3,504,395	1,817,871	1,943,093	2,337,028	4,231,500	78,149,252
	Daily average	635,483	616,526	822,679	113,045	58,641	62,680	75,388	136,500	2,520,942
April:	Month	18,768,743	19,541,310	24,799,768	3,734,253	1,724,460	1,909,552	2,324,810	4,134,000	76,946,896
	Daily average	625,625	651,377	826,658	124,475	57,482	63,652	77,827	137,800	2,564,897
May:	Month	19,044,444	20,587,503	26,214,068	3,978,385	1,659,895	1,914,290	2,565,219	4,402,000	80,365,804
	Daily average	614,337	664,113	845,615	128,335	53,545	61,751	82,749	142,000	2,592,445
June:	Month	18,020,795	19,754,900	25,643,705	3,765,060	1,704,060	1,923,621	2,519,190	3,880,000	77,211,331
	Daily average	600,693	658,490	854,791	125,502	56,802	64,187	83,973	129,300	2,573,711
July:	Month	18,802,024	18,932,514	25,910,929	3,541,409	1,713,680	2,079,769	3,275,894	3,844,000	77,200,219
	Daily average	606,517	581,694	835,835	114,239	55,280	67,089	105,674	124,000	2,490,328
	Total 12 months	260,460,758	239,646,435	307,147,290	42,768,742	21,919,988	22,461,185	29,158,367	49,604,600	973,166,765